NORTH CAROLINA DIVISION OF AIR QUALITY

Preliminary PSD Application Review

Issue Date: Draft – October 2, 2020

Region: Fayetteville Regional Office
County: Montgomery
NC Facility ID: 6200029
Inspector's Name: Jeffrey Cole
Date of Last Inspection: 05/29/2020
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Troy Lumber Company Inc.

Facility Address:
Troy Lumber Company Inc.
110 Leslie Street
Troy, NC 27371

SIC: 2421 / Sawmills & Planing Mills General
NAICS: 321912 / Cut Stock, Resawing Lumber, and Planing

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 15A NCAC 02D .0503, 02D .0504, 02D .0512, 02D .0515, 02D .0516, 02D .0521, 02D .0524, 02D .0530, 02D .0614 and 02D .1111
NSPS: 15A NCAC 02D .0524: NSPS Dc
NESHAP: 15A NCAC 02D .1109: "112(j) Case-by-Case MACT" (Removal); MACT Subpart DDDDD; Subpart DDDD
PSD: BACT (VOC emissions)
PSD Avoidance: 02Q .0317 (NOx, PM, CO_{2eqv})
NC Toxics: House Bill 952 "Unacceptable risk"
112(r): N/A
Other: N/A

Contact Data

Facility Contact	Authorized Contact	Technical Contact
William Talbert Assistant Production Manager (910) 576-6111 110 Leslie Street Troy, NC 27371	Fred Taylor II President (910) 576-6111 110 Leslie Street Troy, NC 27371	Michael Deyo One Environmental of Carolina, PLLC (804) 937-0377 100 Walton Park Lane Midlothian, VA 23114

Application Data

Application Number: 6200029.19A and 6200029.17A
Date Received: 03/12/2019 and 05/01/2017
Application Type: Modification
Application Schedule: PSD

Existing Permit Data
Existing Permit Number: 02330/T24
Existing Permit Issue Date: 02/07/2020
Existing Permit Expiration Date: 01/31/2021

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2018	5.12	45.01	311.13	41.93	33.35	29.52	14.97 [Methanol (methyl alcohol)]
2017	4.67	41.09	306.18	31.00	35.67	28.50	14.74 [Methanol (methyl alcohol)]
2016	4.10	36.09	253.02	27.09	29.10	23.92	12.18 [Methanol (methyl alcohol)]
2015	3.68	32.40	227.21	24.33	26.78	21.48	10.93 [Methanol (methyl alcohol)]
2014	3.98	35.10	246.03	26.34	24.44	23.26	11.84 [Methanol (methyl alcohol)]

Review Engineer: Judy Lee **Review Engineer's Signature:** **Date:**	**Comments / Recommendations:** **Issue:** 02330/T25 **Permit Issue Date:** **Permit Expiration Date:** January 31, 2021

I. Introduction and Background

Troy Lumber Company Inc. (referred to as Troy Lumber throughout this document) is located in Troy, North Carolina, Montgomery County. Troy Lumber is an existing lumber mill which began operations in 1945. The primary product manufactured at this facility is construction grade dimension lumber[1] from green southern yellow pine trees. Other products formed as a result of this operation include wood chips, sawdust, bark and shavings. Southern yellow pine logs are trucked into the site, debarked and cut into lumber at specified dimensions in the sawmill. The green lumber is dried and planed. The dried lumber is sorted by length, size, and grade and transported by truck or rail for delivery to the customer.

The facility is categorized under North American Industrial Classification System (NAICS) code 321912 as Cut Stock, Sawmills & Planing Mills General and Standard Industrial Classification (SIC) code 2421 for Sawmills and Planing Mills. This facility is currently operating under North Carolina Department of Environmental Quality (NC DEQ) Division of Air Quality (DAQ) Title V Permit No. 02330T24 issued on February 7, 2020 with an expiration date of January 31, 2021.

The facility is classified as Title V due to emissions of volatile organic compounds (VOCs), particulate matter (PM_{10}) and hazardous air pollutants (HAPs) exceeding their respective Title V permitting thresholds. The current facility has a facility-wide Prevention of Significant Deterioration (PSD) avoidance condition for VOCs and accepted an annual production limitation of 119.5 million board feet (MMBF)[2] per year. However, as of 2016, the actual facility-wide emissions of VOCs reported in the Emissions Inventory (EI) have been greater than 250 tons per year (tpy), which makes this facility a major source for PSD.

On March 12, 2019, DAQ's Raleigh Central Office (RCO) received an application for a proposed major modification of Troy Lumber's Title V Permit. Per this application, the facility wished to increase the annual throughput through the kilns and remove the existing PSD avoidance condition for VOCs in the permit. This application came in with the purpose of not triggering PSD for any pollutants, other than VOC for this project. The proposed project is

[1] **Dimension lumber:**
Lumber that is sold in a nominal dimension (e.g., a 2x4 is dimension lumber with an actual finished size of 1.5" thick by 3.5" wide) Wood Products Industry Glossary: https://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr113/gloss.pdf

[2] Permit No. 02330T18 (Application No. 6200029.15A) issued on July 29, 2015, with the conversion of Kiln 1 (ID No. ES-KILN-1) from batch to continuous operation combined with the existing batch Kiln 2 (ID No. ES-KILN-2) and Boilers B1 (ID No. B1) and B2 (ID No. ES-Boiler2), the potential to emit (PTE) was greater than 250 tons per year (tpy) of VOCs. In order to avoid PSD for VOC the facility's emissions were limited to 250 tpy of VOC. The applicant requested an enforceable board feet (BF) limit of **119.5 million BF/year** to limit VOC emissions and an enforceable tpy limit on the boilers based on their PTE. The following emission factors (EF) shall be used: DAQ approved 4.09 pounds (lb) of VOC/thousand board feet (MBF) for Kilns 1 and 2; 3.31 tpy VOC for Boiler B1 (0.28 tons VOC/month); and 2.14 tpy VOC for Boiler B2 (0.28 tons VOC/month).

subject to review under 15A NCAC 02D .0530, "PSD," 15A NCAC 02Q .0518, "Final Action," and 40 CFR 51.166. As such, this permitting action is considered a significant modification under 15A NCAC 02Q .0516 and the permit application is being processed as a one-step significant modification pursuant to 15A NCAC 02Q .0501(c), under which a construction and operating permit will be issued. Therefore, per 15A NCAC 02Q .0518, this permit modification is subject to a 45-day review by the Environmental Protection Agency (EPA) in addition to the 30-day public comment period required under 15A NCAC 02Q .0521.

The original application submittal did not contain the appropriate application fee or required number of copies or a zoning consistency determination; thus, the application was deemed incomplete. An acknowledgement letter was sent on March 18, 2019 and an additional information request was sent on April 24, 2019. Subsequent applications were received by DAQ RCO on June 14, 2019 and April 1, 2020 in response to the additional information requests and subsequent requests regarding the baseline emissions (e.g., PSD Avoidance and annual board foot limitations for baseline period), criteria pollutants that exceeded the PSD significant emission rate (SER) other than VOC, appropriate emission factors (EF) and control device efficiencies (CE), calculation methodology, supporting documentation; as well as projected actual emissions calculations and basis.

II. Existing Facility Description

Troy Lumber operates a highly automated sawmill, two steam-heated drying kilns and a planer mill. The kilns are heated by steam produced from two existing wood-fired boilers. Southern yellow pine logs are trucked to the facility, debarked, and processed through the sawmill (ID No. IES-SM) where logs are cut into lumber at specified dimensions. The green rough-cut lumber from the sawmill is stacked and dried in the lumber kilns.

The green lumber is dried in the kilns for 18-24 hours, depending on the initial moisture content, age and size of the wood. Rough cut green lumber is dried to reduce moisture content in the lumber from approximately 50 percent (%) to a target of 19%. Green wood waste (sawdust) and some dry planer shavings are the primary fuels for the existing wood-fired boilers.

The dried lumber is finished by planing (ID No. ES-PM) and trimming (ID No. ES-SH) in the planer mill. Finished lumber is sorted by length, size, and grade; packaged and then shipped off site. Bark from the logs is sold to customers that process it into landscaping material. Poor quality log parts are chipped and used as a paper mill fiber source. Scrap lumber is ground into chips and sold. The remaining green wood chips and planer shavings not used as fuel for the boilers are sold and shipped off site as byproducts.

A. Existing primary facility operations are the kilns and boilers:

Emission Source ID No.	Emission Source Description	Control Device	Emission Source ID No.
ES-KILN-1 **(MACT DDDD)**	One steam-heated/direct-fired/hybrid[3] continuous lumber drying kiln (87.6 million board-feet per year maximum potential lumber charge capacity)	NA	NA
ES-KILN-2[4] **(MACT DDDD)**	One steam-heated batch lumber drying kiln (60.0 million board-feet per year maximum potential lumber charge capacity)	NA	NA
ES-KILN-3[5] **(MACT DDDD)**	One steam-heated/direct-fired/hybrid[6] continuous lumber drying kiln (87.6 million board-feet per year maximum potential lumber charge capacity)	NA	NA

- Two steam-heated continuous lumber kilns (ES-KILN-1 and ES-KILN-3; 87.6 MMBF per year maximum potential each), which receive steam from
- Two existing wood-fired boilers (ID Nos. ES-B1 and ES-Boiler2; 44.5 million British thermal units per hour (million Btu/hr) and 28.69 million Btu/hr, respectively), and one back-up No. 2 fuel oil-fired boiler (ID No. ES-Boiler4)

Emission Source ID No.	Emission Source Description	Control Device	Emission Source ID No.
ES-B1 **(Case-by-Case MACT[7,8])**	One wood-fired boiler with a pre-heater (44.5 million Btu per hour maximum heat input) with flyash reinjection	CD-B-MC1 CD-B-MC2 CD-ESP-1	Two multicyclones (25 eight-inch tubes and 64 six-inch tubes, respectively) Electrostatic precipitator
ES-Boiler2 **(NSPS Dc; Case-by-Case MACT[9,10])**	One wood-fired underfired stoker boiler (28.69 million Btu per hour heat input) with flyash reinjection	CD-Boiler2-1 CD-Boiler2-2 CD-ESP-2	Two multicyclones (18 nine-inch tubes, each) Electrostatic precipitator

[3]A hybrid kiln combines indirect steam heating with direct heat from boiler exhaust gases.
[4] Permit No. 02330T19 (Application No. 6200029.15B) issued on October 5, 2015, significant modification for the addition of new Kiln 3 (ID No. ES-KILN-3), addition of hybrid operation of Kiln 1 and 3, and shut down of Kiln 2. The permit required shut down of Kiln 2 prior to Kiln 3 beginning operation [Kiln 3 commenced operation on May 25, 2016 and Kiln 2 was shut down per FRO inspection report dated December 15, 2016.]
[5] This emission source (ID No. ES-KILN-3) is listed as a 15A NCAC 02Q .0501(c)(2) modification per application No. 6200029.15B. The Permittee shall file a Title V Air Quality Permit Application on or before 12 months after commencing operation in accordance with General Condition NN.1. The permit shield described in General Condition R does not apply and compliance certification as described in General Condition P is not required. [Received on May 1, 2017 (Application No. 6200029.17A) being processed with this PSD application (Section III).]
[6] Ibid 3
[7]This regulation will no longer apply once kilns are fully converted to hybrid operation.
[8]See Section 2.3. of current permit for details regarding MACT Subpart DDDDD.
[9] Ibid 7
[10] Ibid 8

Emission Source ID No.	Emission Source Description	Control Device	Emission Source ID No.
ES-Boiler4[11] **(NSPS Dc; MACT DDDDD[12])**	***Primary Operating Scenario*** Boiler 4: One ultra-low sulfur, distillate fuel oil-fired boiler (32.66 million Btu per hour maximum heat input)	NA	NA
	Alternative Operating Scenario Boiler 4: One limited-use ultra-low sulfur distillate fuel oil-fired boiler (32.66 million Btu per hour maximum heat input)	NA	NA

- Other permitted equipment located at Troy Lumber include the following:

Emission Source ID No.	Emission Source Description	Control Device	Emission Source ID No.
ES-WCS	One sawmill wood waste collection system discharging into the wood fuel silo	CD-C2	One simple cyclone (41 inches in diameter)
ES-PM	One planer mill wood waste collection system	CD-C3	One simple cyclone (156 inches in diameter)
ES-SH	One trim saw and wood hog wood waste collection system	CD-C4	One simple cyclone (108 inches in diameter)

B. Insignificant activities per 15A NCAC 02Q .0530(8):

Emission Source ID	Emission Source Description
IES-DB	Log debarking
IES-BH	Bark handling
IES-SM	Sawmill
IES-WH	Green wood waste handling
IES-TS	Dry wood shavings transfer system
IES-DS	Dry wood shavings storage silo
IES-TL	Dry wood shavings truck loading

[11]No. 2 ultra low sulfur fuel oil-fired boiler (ID No. ES-Boiler4) to be operated when wood-fired boilers (ID Nos. ES-B1 and ES-Boiler2) are being serviced. This boiler was originally permitted on April 30, 2019 upon issuance of permit No. 02330T23. This boiler was recently modified on February 7, 2020 upon issuance of permit No. 02330T24 to allow for an alternative operating scenario as a limited-use boiler (as POS – inadvertently reversed, will be corrected during issuance of this permit). Boiler4 is being modified as a minor modification per 15A NCAC 02Q .0515. The compliance certification as described in General Condition P is required. Unless otherwise notified by NC DAQ, the affected terms of this permit (excluding the permit shield as described General Condition R) for this source shall become final on April 7, 2020. Until this date, the affected permit terms herein reflect the proposed operating language that the Permittee shall operate this source pursuant to 15A NCAC 02Q .0515(f).

[12]Troy accepted a compliance option under Subpart DDDDD per 40 CFR 63.7515(h) and 40 CFR 63.7575 to ONLY combust ultra-low sulfur fuel (i.e. restricting the fuel sulfur content to 15 ppm; 0.0015 percent by weight), which reduced Troy's PTE of all criteria pollutants below PSD Significance levels. (i.e., Troy avoided triggering PSD for sulfur dioxide) during permitting (Permit No. 02330T23) of the No. 2 fuel oil-fired boiler (ID No. ES-Boiler4) issued on April 30, 2019 (Application No. 6200029.18B).

Per the application, the facility has the following insignificant No. 2 fuel oil storage tanks on-site that are not permitted and request addition of these tanks during processing of this permit application:

- Two double-walled 3,000 gallon capacity No. 2 fuel oil above ground storage tanks
- Two double-walled 2,500 gallon capacity No. 2 fuel oil above ground storage tanks

C. Mill Operation:

The mill can operate 24 hours per day, 365 days per year (8,760 hours per year). The maximum production capacity is currently limited to 119.5 MMBF of lumber per year as discussed in Section I above. A facility site map and process flow diagram as provided in Appendix A of the latest application submittal are included in Attachment 1 of this review.

Based on the most recent inspection report performed by Mr. Jeffery Cole of the Fayetteville Regional Office (FRO) dated May 29, 2020, the facility operates at least one boiler and the two drying kilns on a 24 hour per day; 7 days per week basis for 50 weeks of the year (8,400 hours per year). The sawmill and planer operations are currently running on a ten (10) hour per day; 4 days per week; 50 weeks per year schedule (2,000 hours per year). This schedule fluctuates as business conditions dictate.

III. Purpose of Application

The purpose of this PSD modification (Application No. 6200029.19A) is to expand the facility's annual lumber production capacity from 175.2 to 265.41 million board feet per year (MMBF/yr). Per the latest application, the annual lumber production is currently limited by the steam capacity of the two existing wood-fired boilers.

A. The most recent application submittal received by the Division on April 1, 2020 proposes the following list of changes that will be made to the facility to accomplish this expansion:

- Modifying Kiln #2 to operate as a continuous operation lumber drying kiln
- Increasing Kiln #1, #2, and #3 annual permitted throughput to 265.41 MMBF per year
- Installation of a 1,200 horsepower (hp); 57 million Btu per hour wood-fired boiler (ID No. ES-Boiler 3) controlled by two multicyclones and an electrostatic precipitator (ESP) for particulate control
- Wood fuel storage silo (ID No. ES-WCS-2) and associated cyclone (ID No. CD-C5)

Requested installation of the proposed 57 million Btu per hour wood-fired boiler (ID No. Boiler 3) and the restart and conversion of Kiln 2 from a batch process to continuous process will allow the facility to increase total annual lumber production to the requested annual limit of 265.41 MMBF. Kiln #2 has a current batch design throughput of 60 MMBF/yr. The conversion of this steam heated lumber drying batch-type kiln to a continuous kiln will allow for a maximum design throughput of 13 thousand board feet (MBF) per hour per Form B9 of the latest

application submittal. A summary of the requested kiln expansion is provided in the following table:

Kiln	Permitted Capacity	Pre-Project Capacity	Pre-Project Kiln Type	Post Project Capacity	Post Project
K-1	87.6 million BF/yr	119.5 million BF/yr cap to avoid PSD[13]	Continuous steam heated (indirect)	13 MBF/hr each[14]	Continuous steam heated (indirect)
K-3	87.6 million BF/yr				
K-2[15]	60 million BF/yr (shutdown)	0 million BF/yr	Batch steam heated (indirect)		
Proposed total annual lumber production				**265,411 MBF/yr**	

No modifications to any other equipment or changes in method of operations are required to accommodate the requested permitted MMBF lumber production throughput limitation. The permit will contain "phase-in" language for the kilns to accurately reflect the current operating status of Kiln2 (i.e., batch or continuous).

B. Criteria air pollutant emissions expected from the proposed project include emissions of Particulate Matter ($PM/PM_{10}/PM_{2.5}$), Volatile Organic Compounds (VOC), Carbon Monoxide (CO), Sulfur Dioxide (SO_2), Nitrogen Oxides (NO_x), Lead (Pb), and Greenhouse Gases (GHG) or Carbon Dioxide equivalent (CO_{2e}); in addition to emissions of Hazardous Air Pollutants (HAP) and Toxic Air Pollutants (TAP).

The emissions increases expected as a result of this proposed PSD modification are from three primary operations at the lumber mill and will be discussed in more detail in Section V below:

- KILNS – Pollutants of concern are VOC, TAP/HAP (some PM)
- BOILERS – Pollutants of concern are NOx, CO, SO_2, CO_2e, PM (some VOC, TAP/HAP)
- PLANER and Miscellaneous Wood Handling Sources – Pollutant of concern PM

Based on information provided in previous application submittals, the following pollutants: VOC, NOx, PM, and CO exceeded PSD SER. However, the applications indicated PSD triggered only for VOC. Troy Lumber's latest submittal proposes the following limits to avoid triggering PSD for pollutants other than VOC:

1. Maximum combined lumber throughput to Kilns 1, 2, and 3 of 265.41 MMBF per year
2. Maximum combined heat input to all Boilers of 669,731 million Btu per year (million Btu/yr)

[13] Ibid 2
[14] Per most recent application submittal received by the Division on April 1, 2020 - Form B9 of each kiln, maximum design capacity of 13 MBF dried lumber per hour estimated based on historical production.
[15] Ibid 4

The increase in lumber production will also increase NOx emissions (in addition to other pollutants of combustion discussed under Section V in more detail) from the existing boilers and PM emissions at the following unmodified but affected sources: Log preparation (i.e., debarking and cut-up), Planer Mill, Trim Saw and Wood Hog, Wood Fuel Silo, and Roads. The increase in lumber production will also result in an increase in the existing boilers utilization and fuel usage.

As detailed in Section 5.1 of the April 1, 2020 application submittal, calculations of maximum potential emissions from the installation of the proposed wood-fired boiler and the increased kiln and existing boiler throughputs result in emissions increases in exceedance of the PSD SER thresholds for several pollutants. Table 5-2 of the application indicates that PM, NOx, VOC and CO_2e exceed the PSD SER. Therefore, Troy Lumber is requesting the permit limitations provided above to limit future projected emissions of all pollutants other than VOC, to levels below PSD significance (i.e., the facility has performed a "past actual versus future projected" analysis using the permit limitations above).

A PSD avoidance condition will be placed in the revised PSD permit (Section V.C.14. below) instead of a 02D .0530(u) condition.

C. In addition to processing the PSD application, the following permit modifications were consolidated into the revised PSD permit due to modifications being processed after receipt of the initial PSD application or are considered as part of this project (Refer to Attachment 2 for a summary of Troy Lumber's permitting history and application chronology for this modification):

1. Per 15A NCAC 02Q .0504 of permit No. 02330T19 issued on October 5, 2015, the facility was required to file a Title V Air Quality Permit Application on or before 12 months after commencing operation of kiln 3 (ID No. ES-KILN-3)[16] and in accordance with General Condition NN.1. The permit application (Application No. 6200029.17A) received on May 1, 2017 also requested to undo the permit changes associated with issued Permit 02330T19 (Application No. 6200029.15B) which exempted the two existing boilers from the maximum achievable control technology (MACT) for 40 CFR Part 63, Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters) referred to as the Boiler MACT with the conversion of the kilns to hybrid operation.[17] Troy decided not to pursue the conversion of Kiln 1 and Kiln 3 to hybrid operation, in addition to undoing most of the requested changes associated with issuance of Permit No. 02330T19. This part two significant modification will be processed with this PSD application.

   Excerpt from review for issued Permit No. 02330T19:
   Current Application No. 6200029.15B and Proposed Permit 02330T19
   A new continuous dual path steam-heated Kiln 3 is proposed under this application. This kiln is rated at **87.6 MBF/year**. It is also proposed that Kiln 3 will be designed with future enhanced energy recovery measures for hybrid operation as it will have the capability to receive the heated flue gases from the existing wood-fired boilers B1 and/or Boiler2. In that mode, the Kiln 3 exhaust points will also be the "new" points of release to the atmosphere for

[16] Ibid 5
[17] Ibid 3

the redirected boiler emissions. Existing batch Kiln 2 will be shut down upon operation of Kiln 3.

Also proposed is the future modification of Kiln 1 to hybrid operation. As with Kiln 3 it will be designed with future enhanced energy recovery measures for hybrid operation. It will also have the capability to receive the heated flue gases from the existing wood-fired boilers B1 and/or Boiler2. In the hybrid mode the emissions created by the boilers will essentially become kiln emissions. It should be noted that in both kiln conversions, the Permittee is not requesting modification of the two existing boilers other than the addition of ductwork/flues and associated modifications for the routing of gases to the kilns.

Thus, the existing boilers are no longer exempt from the Boiler MACT requirements per 40 CFR 63.7491(h) since they never operated in hybrid mode as permitted on October 5, 2015 (02330T19). The application submittal received on May 1, 2017 was deemed incomplete and an additional information request was sent to Troy Lumber on May 9, 2017. It was determined that a response to the additional information request was no longer necessary. Receipt of this PSD application fulfilled the requirements; thus, the requested changes to revert equipment back to previous status would be consolidated into this PSD modification request.

2. In order to comply with the Boiler MACT requirements for the two existing wood-fired boilers, the facility submitted a minor permit modification (Application No. 6200029.18A received May 17, 2018) request for the installation of ESPs on each of the two existing wood-fired boilers (ID Nos. B-1 and ES-Boiler2) and the addition of a 32.66 million Btu/hr No. 2 fuel oil fired temporary boiler. An additional minor modification request (Application No. 6200029.18B received on September 25, 2018) requesting that the proposed temporary boiler be permitted as a permanent boiler by removing the restrictions on hours of operation and fuel usage necessary for temporary boiler status was received and consolidated with application No. 6200029.18A.

   To avoid triggering PSD for SO_2, the facility selected a compliance option under the Boiler MACT to only fire ultra-low sulfur[18] fuel in the proposed 800 hp No. 2 fuel oil-fired boiler (ID No. ES-Boiler4). Boiler 4 is only expected to operate when Boilers 1 and 2 (ID Nos. ES-B1 and ES-Boiler2) are being serviced.[19] On April 24, 2019, Troy submitted Permit Application No. 6200029.19B for an administrative amendment to change the date Boilers 1 and 2 were required to conduct performance testing to demonstrate compliance with the applicable particulate matter emission limits under 15A NCAC 02D .0504. Troy requested this date change to be in alignment with the MACT performance testing requirements for Boilers (to which the wood-fired boilers are subject to due to the conversion to hybrid operation not be completed prior to the May 20, 2019 compliance date). Therefore, Troy requested that the test date be revised to August 30, 2019. DAQ evaluated this request and determined that, since a performance test would be required for the new ESPs being installed

[18] Ibid 12

[19] Troy Lumber's revised permit for this PSD project will restrict operation to only 3 boilers at a time based on the applicants request for Boiler 4 to be operated as a backup boiler (Application No. 6200029.18B received on September 25, 2018).

on Boilers 1 and 2, it was appropriate to change the date to no later than November 16, 2019 (which corresponds to 180 days after the Boiler MACT May 20, 2019 compliance date). The proposed modifications were finalized upon issuance of Title V Permit No. 02330T23 on April 30, 2019.

3. The applicant submitted a separate minor modification request (Application No. 6200029.20A) received on December 27, 2019 to add an alternative operating scenario (AOS) to the changes made during processing of permit No. 02330T23 (Application No. 6200029.18B) described above (issued on April 30, 2019) which included addition of one 32.66 million Btu/hr ultra-low sulfur[20] distillate fuel-fired boiler (ID No. ES-Boiler4). The facility requested to change the primary operating scenario (POS) of this boiler to limited-use as defined in 40 CFR Part 63.7575 and make the current permitted scenario an AOS. This minor permit modification was processed and revised Title V Permit No. 02330T24 issued on February 7, 2020.

Baseline emissions were determined based on the average annual emissions from the consecutive 24-month period for calendar years 2016 and 2017 for the facility operations that existed during the baseline period. Based on a review of the application and a historical review of Troy Lumber's operations, as well as the previous PSD status change from Major to Minor by accepting a PSD Avoidance condition in permit revision 02330T18; pursuant to 15A NCAC 02D .530(b)(1)(A)(iii), the selected baseline period in 2016 and 2017 is not allowed to exceed the avoidance throughput limit of 119.5 million board feet per year for the baseline calculations (refer to additional information request sent to facility on April 24, 2019).

The future projected emissions from this project, as limited by the proposed production and heat input limits detailed in Section III.B. above, were then compared to the baseline emissions to determine if the project triggered a PSD review. As presented in Table 1 (and Table 5-3) of the most recent application submittal received on April 1, 2020, inserted below, under the future projected analysis scenario, emissions increases are less than PSD SERs for all criteria pollutants except for VOC.

[20] Ibid 11 and 12

Table 1. Projected Emissions Increases and Comparison to PSD Thresholds

Pollutant	BAE Estimated Actual Annual Emissions (2016 - 2017)	Project Future Projected Emissions Increases	Project Future Projected - Baseline Actual Emissions	PSD Significant Emission Rates	PSD Triggered
	tons/year	tons/year	tons/year	tons/year	Y/N
PM	58.85	83.84	24.99	25	N
PM_{10}	36.88	34.97	-1.92	15	N
$PM_{2.5}$	3.21	7.08	3.87	10	N
NOx	34.38	73.67	39.29	40	N
CO	31.14	80.37	49.23	100	N
SO2	3.91	8.37	4.47	40	N
VOC	288.26	640.03	351.77	40	Y
Lead	0.008	0.016	0.01	0.6	N
CO2 eq	32,745	70,172	37,427	75,000	N

Because the proposed project will be a major modification to a major source of certain criteria air pollutants, the applicant is applying to the NC DAQ for a PSD construction permit. The PSD application will be processed as a one-step significant as discussed in Section I above.

IV. Continuous Kiln

"[21]Typically, lumber yard managers have had two choices when purchasing lumber drying equipment: direct-fired kilns and steam-heated indirect-fired lumber drying kilns. Both choices present unique problems associated with costs and drying effectiveness. Because of the ash and soot they produce, ordinary direct-fired kilns often discolor the lumber during drying, which significantly reduces its value. There is also danger of explosion or fire due to the soot and ash which enter the kiln with the heating air. Direct-fired kilns are generally very cost effective because they use wood residue as fuel. Steam-heated indirect-fired kilns produce cleaner wood than direct-fired kilns, but the day-to-day operating costs are significantly higher compared to direct-fired kilns. Over time the steam tubes and joints wear out which leads to high replacement costs."

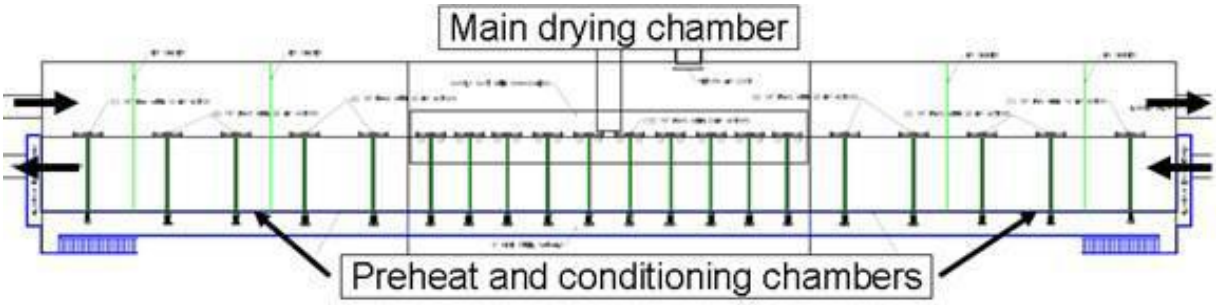
Continuous lumber drying kilns are an emerging technology that significantly improves productivity, lumber grade and energy efficiency as compared to the operation of conventional batch-fed kilns. The continuous kilns differ from batch kilns in that they have preheat/conditioning chambers on both ends of the main drying chamber and a pusher system.

[21] http://www.energyonlineexpo.com/slinkimages/58/millwide_insider_january_2009.pdf

Typical Continuous Lumber Drying Kiln

The continuous kilns are fully automated and operated by programmable logic controllers (PLCs), to advance the lumber through the kiln. These additional chambers are constructed on each end of the kiln heating chamber and a pusher system on each end conveys a continuous feed of lumber on one track into the kiln and on a second track in the opposite direction out of the kiln.

The continuous drying kiln (CDK) chamber has a reverse flow double track design and incorporates preheating, drying, cooling, equalizing and conditioning phases all in one extended chamber. The lumber stacks traverse through the kiln in opposite directions on the two tracks. The lumber is automatically advanced, based on the moisture content of the lumber in the main drying (central) section by a set of hydraulic pusher units.[22] The advancement of the lumber into the zones and speed is automatically controlled by software based on thermocouples placed strategically on the lumber stacks.



The CDK's three chambers are designed to provide and control the environmental conditions of heat, relative humidity and air circulation necessary for the proper drying of wood.

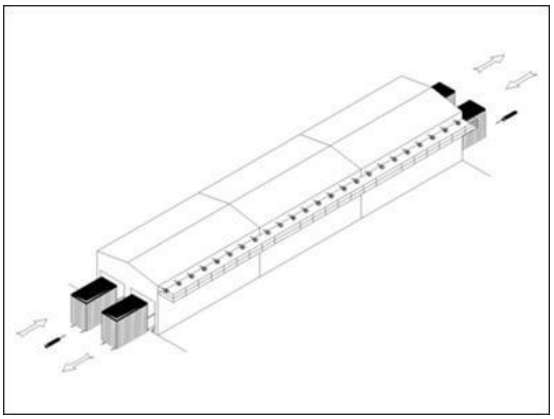
In the first chamber or pre-heat zone the incoming green lumber is pre-heated using the heat coming off the dry lumber while providing added moisture and saturated cooling for the dried

[22] http://www.wellons.com/cdkkilnd.html

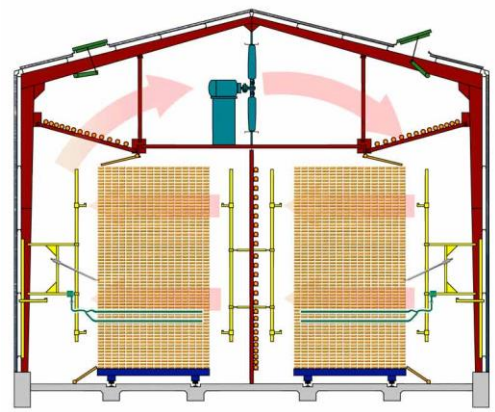
lumber. The moisture conditioning reduces stress and results in a more uniform moisture distribution in the dry lumber.

In the middle chamber (main drying zone), heat from the steam coils (highest temperature zone) will be introduced to dry the lumber. The main drying chamber consist of fans to assist in directing the heat within the drying chamber to keep the temperature consistent.

The end zone (or conditioning zone) conditions the dried wood while preheating the incoming green lumber. The heat from the dried lumber coming out of the kiln preheats the green lumber entering the kiln on the second track, resulting in additional efficiency gains. In addition, the moisture that is driven off of the green lumber conditions the dried lumber exiting the kiln main drying zone resulting in improved product quality.

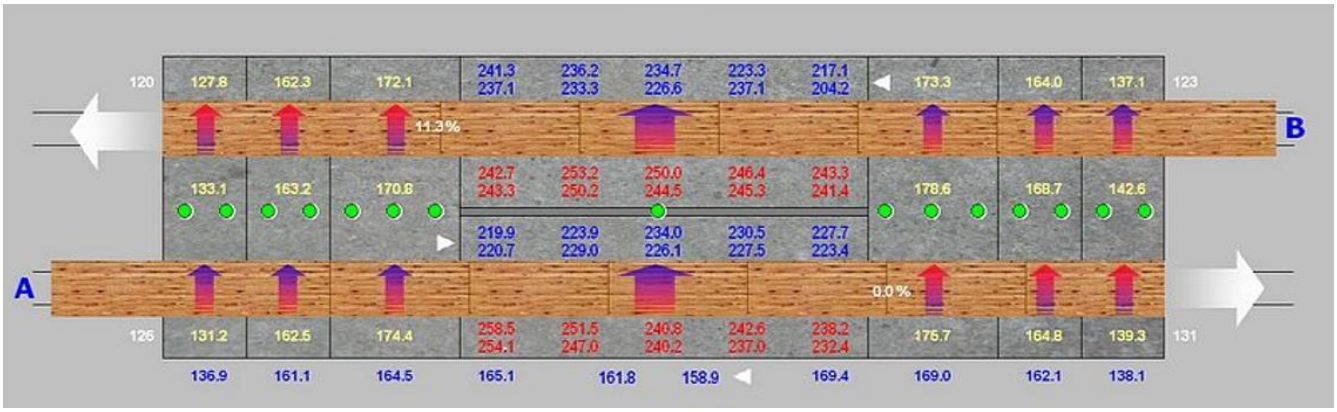


Kiln Configuration



Track Loading

The CDK operation is continuous and only shuts down for unplanned malfunction events or planned maintenance outages. Continuous operation results in heat being retained, unlike the heat that is lost between batches in a traditional batch kiln when the doors open. For a typical CDK (see diagram below), temperatures inside the end chambers range from approximately 130 to 170 degrees Fahrenheit (°F). Since there is essentially no downtime between batches, the CDK remains at desired operating temperatures which results in significant energy savings.



For safety and quality control reasons the controlling of the CDK lumber advance speed, selecting a fan and motor configuration to ensure effective heat transfer, monitoring the exiting temperature at the end zones open doorways and activating alarm and safety procedures should a dangerously high temperature situation arise, are very crucial for the operation.

Traditional batch lumber kilns are generally equipped with 10 or higher equidistant individual roof vents following the ridge of the roof. An equal number of vents are located on each side of the kiln roof, and each set of vents reacts in unison during the kiln drying cycle. At any given time, one set of vents allows moisture to exhaust from the kiln while the other set of vents allows dry make-up air to enter from the atmosphere.

A natural draft through the exhaust vents is required to minimize spontaneous condensation of the water vapor inside the kilns and significantly reduce process-related water emissions. Since the continuous kiln is not closed on the ends, less exhaust gases leak through the kiln structure than in a batch kiln (as the internal environment is at a lower pressure), with more exhaust gases exiting out the ends of the kiln. The continuous kiln entry and exit openings must remain open to facilitate the continuous nature of the process.

The rate of lumber advancement and the circulating air volume in the chambers of a CDK system impacts directly on the exiting air temperature at the open ends of the CDK. Higher speed than optimum will raise the exiting air temperature. Insufficient air flow in the zones will not allow for sufficient heat transfer between the hot dry lumber and the cold green lumber.

Within the kiln, lumber will automatically advance based on its moisture content in the central heating zone where the wet bulb temperature is considerably less than the dry bulb temperature (low relative humidity). As the wood enters the end section, the wet-bulb temperature is expected to rapidly climb from ambient to approximately 50% of the differential in wet bulb between ambient and the central chamber. As the lumber exits, it reaches a point where the dry wood temperature drops below the wet bulb temperature, causing it to “rain” in the kiln. This “rain” effect conditions the wood. Gases exhaust through the open exit doors at both ends of the kiln and through roof vents. Roof vents are generally used to expedite cooling of the kilns during a shutdown or malfunction. In addition, the vents may be used for intake air during lumber drying. The vents will not discharge emissions during the active lumber drying process. The emissions coming from the kiln vents during this cool down process will be much lower than those coming from the kiln doors during the active drying process.

The main drying zone has a typical design temperature range of 223 to 250 °F. The exit temperature of the kiln is variable based on ambient temperature and other factors. The average rate of travel of the lumber inside the kilns and the average total time spent inside the kiln is variable depending on outside temperature, moisture content and size of the lumber (e.g., a 4 x 4 will take approximately twice the drying time as a 2 x 4) and various other factors. As discussed under Section II, all cut green lumber is sent to the kilns where it is dried for approximately 18-24 hours, depending on the variables discussed above. The facility desires a lumber moisture content of approximately 19% by weight of finished product at the exit end of the kiln.

Per the application submittal, upon project completion, each kiln will have the capability of processing 13 MBF per hour. Troy Lumber's kiln operating procedures are detailed in Section VI. Best Available Control Analysis (BACT) below. Currently, each kiln reaches a minimum temperature of approximately 225 °F for approximately 8 hours. This ensures that there are no parasites (e.g. nematodes, southern pine beetle) in the wood. Kiln-drying over 130 degrees normally kills most insects that prefer moist wood.[23] Once the wood is dried it goes to the planer mill where a final end cut is made; then passed through a planer which finishes the dimensional lumber. After the wood passes through the planer it is sorted by grade and bundled.

V. Emissions and Regulatory Summary

The proposed PSD project as briefly discussed under Section III above will be summarized in more detail below, including detailed emissions calculations and regulatory applicability.

A. The following sources are part of the startup and conversion of the batch kiln (Kiln #2) to continuous kiln; and annual kiln (Kilns #1, #2 and #3) throughput increase project:

- One steam-heated indirect-fired batch lumber drying kiln permitted operating rate of 60 MMBF/yr (ID No. ES-Kiln-2) to be restarted[24] and converted to a steam-heated indirect-fired continuous lumber drying kiln
- One steam-heated indirect-fired continuous lumber drying kiln permitted operating rate of 87.6 MMBF/yr (ID No. ES-Kiln-1)
- One steam-heated indirect-fired continuous lumber drying kiln permitted operating rate of 87.6 MMBF/yr (ID No. ES-Kiln-3)
- Proposed wood-fired boiler (ID No. ES-Boiler3) with associated multicyclones (ID No. CD-BOILER3-1 and CD-BOILER3-2) connected in series to an ESP (ID Nos. ESP-3)
- Proposed wood fuel silo (ID No. ES-WCS-2) wood (sawdust) collection system for Boiler 3
- One ultra-low sulfur[25] No. 2 fuel oil-fired boiler (ID No. ES-Boiler4) [Application Nos. 6200029.18B and 6200029.20A, refer to reviews for issued permit Nos. 02330T23 and 02330T24. This boiler will only be used when existing boilers #1 and #2 (ID Nos. ES-B1 and ES-Boiler2) are being serviced.]

After several email exchanges and teleconferences between DAQ staff and Troy Lumber, an application submittal including revised emission calculations, emission factors (EF), control device efficiencies (CE) and requested limits to avoid triggering PSD for all pollutants, except VOC, was received on April 1, 2020.

The facility used a variety of EFs for the above changes as listed below:

[23] Wood Magazine, "Insects can take their toll," https://www.woodmagazine.com/materials-guide/lumber/insects-can-take-their-toll
[24] Ibid 4
[25] Ibid 11 and 12

- National Council for Air and Stream Improvement, Inc. (NCASI)[26];
- U.S. Environmental Protection Agency (EPA) AP-42[27] Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources (5th Edition, Revised);
- US EPA's Mandatory Greenhouse Gas Reporting Regulation (40 CFR 98)[28];
- NC DAQ's Wood, Generation and Combustion of "Waste" Guidance;
- NC DAQ's Emission Estimation Spreadsheets (e.g., lumber kilns, fuel combustion for wood waste and fuel oil, etc.);
- NC DAQ's Control Device Analysis Spreadsheets (e.g., cyclones); and
- 2014 Site Specific Emissions Testing performed on the two existing wood-fired boilers

B. Emissions increases from the proposed new sources and as a result of the requested production increases are summarized below:

1. Steam-heated indirect-fired continuous lumber drying kilns

The proposed increase in annual kiln drying capacity from Troy Lumber's permitted capacity of 175.2 MMBF to 265.4 MMBF will be a source of PM, VOC, HAP and TAP emissions. The basis for annual expected emissions for the PSD analysis is based on the facility's requested annual production limit of 265,411 MBF from all three continuous kilns (ID Nos. ES-KILN-1, ES-KILN-2 and ES-KILN-3).

Troy Lumber's proposed use of NCASI VOC EF of 4.78 pounds of VOC (as pinene) per thousand BF (lb/MBF)[29] for calculating future actual emissions was approved per most recent guidance provided by DAQ's Compliance and Permitting Workgroups as of July 30, 2019. At the proposed lumber production limit, VOC emissions from the projected increase in lumber throughput exceed SER for VOC emissions as estimated below:

$$(265.4 - 175.2)\ million\ BF\ capacity = 90.2\ MMBF\ annual\ capacity\ increase$$

$$90{,}200\ \frac{MBF}{yr} * 4.78\ \frac{lb\ VOC}{MBF} * \frac{ton}{2{,}000\ lb} = \ 215.56\ \frac{tons}{yr}\ VOC$$

[26] NCASI Emission Factors – NCASI conducts research and provides technical information to all member companies through a variety of publications, including technical bulletins, special reports, handbooks, and newsletters. The emission factor information presented in the technical bulletins is typically deemed the most accurate available for the wood products industry if representative mill-specific test data or similar facility test data are unavailable.

[27] US EPA AP-42, Fifth Edition Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources (5th Edition, Revised)

[28] US EPA Mandatory Greenhouse Gas (GHG) reporting rule emission factors and global warming potentials from Subparts A (General Provision) and C (General Stationary Fuel Combustion Sources) and Tables "Table C-1 to Subpart C of Part 98 - Default CO_2 Emission Factors and High Heat Values for Various Types of Fuel" and "Table C-2 to Subpart C of Part 98 - Default CH_4 and N_2O Emission Factors for Various Types of Fuel" were used to calculate emissions from carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) from wood and distillate fuel oil No. 2 combustion. [eCFR as of April 30, 2020]

[29] NCASI Technical Bulletin No. 845, A Comparative Study of VOC Emissions from Small-Scale and Full-Scale Lumber Kilns Drying Southern Pine (2002) and Wood Products Electronic Database (2013) details VOC emission factors for wood drying (includes updated EF of 4.78 lb/MBF. DAQ approved 4.78 lb/MBF EF as of July 30, 2019.

$PM/PM_{10}/PM_{2.5}$ emissions[30] expected from projected increase in kiln capacity are based on EFs from NCASI and NC DAQ's Wood Kiln spreadsheet as estimated below:

$$90{,}200\ \frac{MBF}{yr} * 0.02231\ \frac{lb\ PM}{MBF} * \frac{ton}{2{,}000\ lb} = \ 1.01\ \frac{tons}{yr}\ PM$$

2. Wood-fired and No. 2 Fuel Oil-fired boilers

Emissions from the new boilers (ID Nos. ES-Boiler3 and ES-Boiler4) will be a source of $PM/PM_{10}/PM_{2.5}$, SO_2, NOx, CO, VOC, Pb, CO_2 equivalent, HAP and TAP pollutants.[31]

Pursuant to 15A NCAC 02D .0530(b)(1)(B), for a new emissions unit, the baseline actual emissions (BAE) for purposes of determining the emissions increase that will result from the initial construction and operation of such unit shall equal zero and thereafter, for all purposes, shall equal the unit's potential to emit (PTE).

Emissions from the oil-fired boiler (ID No. ES-Boiler4) are provided below. Due to the oil-fired boiler only being used as a backup boiler, boiler emissions are excluded from the PSD analysis. The PSD application must include a discussion per 40 CFR 51.166(b)(40), (42) and 40 CFR 51.166(r) of any amount of emissions excluded and an explanation for why such amount was excluded from the projects projected actual emission calculations.[32] Section 1 and Section 5.1.3 of the latest application submittal provides a discussion of excluded emissions. The Division agrees with the emissions exclusion from this PSD project due to the No. 2 fuel oil-fired boiler only operating when the existing wood fired boilers (ID Nos. ES-B1 and Boiler2) are being serviced as requested during permitting.[33] The Division's decision to exclude the emissions from Boiler4 is based on the potential impact to the environment. The environment is presumed to already see the emissions from the two existing wood-fired boilers (worse-case fuel); thus, when one of the existing wood-fired boilers is down for servicing or maintenance, etc., the No. 2 fuel oil-fired boiler becomes operational emitting less emissions to the atmosphere. A comparison of the potential hourly emission rates before controls expected from the ultra-low sulfur[34] boiler to the wood-fired boilers are less for all criteria pollutants. Expected emissions from Boiler4 are presented in the table below and in the projected actual emissions analysis (refer to Section V.C.8.b. below). In addition, the revised PSD permit will contain a restriction that only 3 boilers can operate at any given time.[35] Thus, the amount of emissions and impact on the environment from the No. 2 fuel oil-fired boiler would not be any greater than what would be emitted from either of the existing two wood-fired boilers.

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[30] NC DAQ Wood Kiln Emissions Calculator Revision C (July 2007) EF for Steam heated Southern Pine lumber
[31] US EPA AP-42, Chapter 1: External Combustion Sources, Section 1.6, Wood Residue Combustion in Boilers and Section 1.3, Fuel Oil Combustion
[32] US EPA memorandum dated December 7, 2017 New Source Review Preconstruction Permitting Requirements: Enforceability and Use of the Actual-to-Projected Actual Applicability Test in Determining Major Modification Applicability. Per 40 CFR 52.21(a)(2), 52.21(r)(6) if required the pre-project record must contain the amount of emissions excluded under 40 CFR 52.21(b)(41)(ii)(c) and an explanation for why such amount was excluded.
[33] Ibid 11
[34] Ibid 12
[35] Ibid 19

a. Prevention of Significant Deterioration Analysis – Installation of Boiler 4

Pollutant[36]	Permit Application PTE (tpy)	Revised PTE using Boiler MACT Limit (tpy)[a]	PSD SER (tpy)	Is PSD Review Required?
Total PM	3.42	3.37	25	No
PM_{10}	1.04	1.02	15	No
$PM_{2.5}$	0.26	0.26	10	No
SO_2	73.6	0.22	40	No
NO_X	20.7	20.4	40	No
CO	5.18	5.11	100	No
VOC	0.21	0.20	40	No
Lead	0.0013	0.0013	0.600	No

[a] Troy selected a compliance option under the Boiler MACT to only burn ultra-low sulfur fuel. Therefore, the revised PTE was calculated using the AP-42 SO_2 emission factor (lb/1000 gallon) = 142xS, where S=sulfur content of 0.0015 percent by weight. SO_2 emission factor = 0.213 lb/1000 gallon (Refer to review for issued Permit No. 02330T24 for more details).

Example calculation for Boiler 4 (excerpt from review for issued permit 02330T24):

SO_2 emission factor (lb/1,000 gallon) = 142xS, where S indicates that the weight % of sulfur in the oil should be multiplied by the value given. For example, if the fuel is 1% sulfur, then S = 1.

S = sulfur content of 0.0015 percent by weight (15 ppm ultra low sulfur liquid fuel):

$$SO2\ EF = 142 * 0.0015 = 0.213\ \frac{lb}{1{,}000\ gallon}$$

$$\frac{0.213\ lb}{1{,}000\ gallon} * \frac{gallon}{140{,}000\ Btu} * \frac{1{,}000{,}000\ Btu}{million\ Btu} * 32.66\ \frac{million\ Btu}{hr} * 8{,}760\ \frac{hrs}{yr} * \frac{ton}{2{,}000\ lb}$$

$$= 0.2176\ tpy\ SO2$$

In comparison, the existing wood-fired boilers PTE for SO_2 are 4.87 tpy for Boiler 1 and 3.14 tpy for Boiler 2 (refer to Section V.C.8.b. below for more information on boiler emissions).

Emissions from the proposed wood-fired boiler (ID No. ES-Boiler3) are discussed and summarized in detail below:

Per Form B1 for Boiler 3 the boiler is an indirect fired 57 million Btu/hr wet wood (>19% moisture)-fired burner controlled with flyash reinjection with stoker fuel feed industrial boiler.

At the time of Troy Lumber's original application submittals (March 12, 2019 and June 14, 2019), the PSD SER for $PM_{2.5}$, CO and NOx for this proposed wood-fired boiler (and Total PM for this PSD project) were exceeded based on its PTE utilizing vendor data (which was never provided), AP-42 or DAQ EFs. The original application submittals proposed the use of PM and CO lb/MMBtu site-specific tested emission rates from 2014 stack tests performed on the two

[36] US EPA AP-42, Chapter 1: External Combustion Sources, Section 1.3, Fuel Oil Combustion

existing wood-fired boilers (ID Nos. B1[37] and Boiler2[38]) for the proposed new wood-fired boiler (ID No. ES-Boiler3). This review engineer discussed this issue with Mr. Gary Saunders of RCO's Stationary Source Compliance Branch (SSCB) and requested an approval or denial memorandum for PSD applicability purposes. On March 19, 2020, Mr. Saunders prepared a memorandum[39] approving the use of the highest emission rate values found at the test on Boiler 2 (2014-061ST) with the following emission rates to be used as "EFs" for this PSD application with a recommendation for testing of the proposed wood-fired boiler (ID No. ES-Boiler3) after startup (please refer to memorandum for more details):

Pollutant	Emission rate	Units
CO	0.24	lb/million Btu
Filterable PM	0.211	
Condensable PM	0.007	
Total PM	0.217	

Note: these performance tests were conducted prior to the addition of ESPs on the two existing wood-fired boilers added during processing of Permit No. 02330T23 (Application No. 6200029.18B). Addition of the ESPs will further reduce the emissions of PM.

b. Prevention of Significant Deterioration Analysis – Installation of Boiler 3 (ID No. ES-Boiler3)

Pollutant	Permit Application Form B – PTE before controls or limit (tpy)	Permit Application Form B – PTE after controls or limits (tpy)	PSD SER (tpy)	Is PSD Review Required?
Total PM[40]	54.54	5.45	25	No
PM_{10}	54.54	5.45	15	No
$PM_{2.5}$	~~1.76~~ 34.2	~~0.18~~ 3.42	10	No
SO_2[41]	6.28	6.28	40	No
NO_X[42]	55.29	55.29	40	Yes
CO[43]	60.32	60.32	100	No

[37] Memorandum from James Hammond, SSCB to Steven Vozzo, FRO dated April 27, 2015 regarding source testing of wood-fired boiler (ID No. ES-B1); Total PM per EPA Method 5/202 is 0.107 lb/million Btu (No. 2014-162st). Testing performed on Boiler#1, ID No. ES-B1 on July 16, 2014. CO EF of 0.17 lb/million Btu was obtained from a copy of the actual stack test (Method 10 – highest of 3 runs) provided by the applicant via email on July 1, 2019.
[38] Memorandum from James Hammond, SSCB to Steven Vozzo, FRO dated April 27, 2015 regarding source testing of wood-fired boiler (ID No. ES-Boiler2); Total PM per EPA Method 5/202 is 0.217 lb/million Btu (No. 2014-061st). Testing performed on Boiler#2, ID No. ES-Boiler2 on May 22, 2014. CO EF of 0.24 lb/million Btu was obtained from a copy of the actual stack test (Method 10 – average of 3 runs) provided by the applicant via email on July 1, 2019.
[39] Memorandum from Gary Saunders, SSCB to Judy Lee, Permits Branch dated March 19, 2020, Review of 2014 Performance Test Results from Boiler 1 and Boiler 2 for Use as Emission Factors (PM and CO) for PSD Applicability for New Boiler 3.
[40] Ibid 39 (Total PM EF = 0.217 lb/million Btu)
[41] US EPA AP-42, Chapter 1: External Combustion Sources, Table 1.6-2 Table. EMISSION FACTORS FOR NOx, SO2, AND CO FROM WOOD RESIDUE COMBUSTION, Source Category: Bark/bark and wet wood/wet wood-fired boiler (SO_2 EF = 0.025 lb/million Btu)
[42] Ibid 41 (NOx EF = 0.22 lb/million Btu)
[43] Ibid 39 (CO EF = 0.24 lb/million Btu)

Pollutant	Permit Application Form B – PTE before controls or limit (tpy)	Permit Application Form B – PTE after controls or limits (tpy)	PSD SER (tpy)	Is PSD Review Required?
VOC[44]	4.27	4.27	40	No
Lead[45]	0.012	0.012	0.600	No
CO_2 equivalent[46]	52,666	52,666	75,000	No

The proposed project's increase in NOx emissions from the proposed wood-fired boiler (ID No. ES-Boiler3) based on its PTE exceeds the PSD SER of 40 tpy as calculated below:

$$0.22\ lb\frac{NOx}{million}Btu * 57\ million\frac{Btu}{hr} * 8{,}760\frac{hrs}{yr} * \frac{ton}{2{,}000}lb = 54.92\ tpy\ NOx$$

However, as discussed in Section III above, Troy Lumber requests to limit their annual lumber throughput for all three kilns to 265,411 MBF and limit annual combined heat input to all boilers to 669,731 million Btu/yr to avoid triggering PSD for pollutants other than VOC. As presented in Section III above, Table 1 (and Table 5-3) of the application submittal received on April 1, 2020, indicates that this will result in NOx emissions increase of 39.29 tons based on the past actual versus future projected emissions increases.

The applicant's criteria air pollutant emissions as presented in the summary table above were duplicated, except for $PM_{2.5}$ which is discussed in more detail below.

Form B for proposed Boiler 3 and Table C-5.1 (EF = 0.01 lb/million Btu for $PM_{2.5}$) of the revised application submittal indicate that the $PM_{2.5}$ EF is site-specific. However, a review of the electronic spreadsheet provided via email on April 2, 2020, reveals that the $PM_{2.5}$ EF used for all 3 wood-fired boilers is 0.007 lb/million Btu. This appears to be the 2014 stack test emission rate for condensable PM. As presented in the emission rate table above, only Method 5 (filterable) and Method 202 (condensable) testing for PM were performed on the two existing boilers in 2014. No testing was performed for $PM_{2.5}$.[47]

Due to a lack of other available data (e.g., vendor data or site-specific test data) to support the proposed $PM_{2.5}$ EF provided in the application, emission estimates were calculated using AP-42 $PM_{2.5}$ EFs below:

[44] US EPA AP-42, Chapter 1: External Combustion Sources, Table 1.6-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS, TOC, VOC, NITROUS OXIDE, AND CARBON DIOXIDE FROM WOOD RESIDUE COMBUSTION (VOC EF is 0.017 lb/million Btu. Table C-5.1 also uses 0.017 lb/million Btu.)
[45] US EPA AP-42, Chapter 1: External Combustion Sources, Table 1.6-4. EMISSION FACTORS FOR TRACE ELEMENTS FROM WOOD RESIDUE COMBUSTION (Pb EF = 4.8 x 10^{-5} lb/million Btu)
[46] Ibid 28 – 40 CFR 98 [Note: Per DAQ spreadsheet DO NOT use GHG emission estimates for PSD purposes]
[47] Ibid 37, 38 and 39

❖ Wet wood with mechanical collector[48]:

[(0.12 filterable + 0.017 condensible) lb/million Btu] = 0.137 lb/million Btu

$$0.137\ \frac{lb\ PM2.5}{million\ Btu} * 57\ \frac{million\ Btu}{hr} * \frac{ton}{2{,}000\ lb} * \frac{8{,}760\ hr}{yr} = 34.20\ tpy\ PM2.5 * \left(\frac{100-90}{100}\right)$$

$$= 3.42\ tpy\ PM2.5\ less\ than\ SER\ of\ 10\ tpy\ PM2.5$$

❖ All fuels with an electrostatic precipitator[49]:

[(0.035 filterable + 0.017 condensible) lb/million Btu] = 0.052 lb/million Btu

$$0.052\ \frac{lb\ PM2.5}{million\ Btu} * 57\ \frac{million\ Btu}{hr} * \frac{ton}{2{,}000\ lb} * \frac{8{,}760\ hr}{yr}$$

$$= 12.98\ tpy\ PM2.5\ greater\ than\ SER\ of\ 10\ tpy\ PM2.5$$

The proposed wood-fired boiler 3 will be controlled by two multiclones (ID Nos. CD-BOILER3-1 and CD-BOILER3-2) prior to an ESP (ID No. CD-B-MC-ESP). Based on this control scenario, $PM_{2.5}$ emissions were estimated using the controlled emissions rate from the mechanical collector and applying an ESP CE of 90%[50, 51] as calculated above versus AP-42's $PM_{2.5}$ controlled EF for "all fuels with an ESP," which exceeds the SER for $PM_{2.5}$ as calculated above.

SSCB's memorandum dated March 19, 2020 approving the use of the 2014 PM and CO EF's for PSD applicability was significant in determining whether PSD triggered for these pollutants (PM and CO). Emissions of CO from the proposed wood-fired Boiler 3 are calculated below using AP-42 EFs and approved emission rates from SSCB's memorandum:

CO EF = 0.60 lb/million Btu[52] x 57 million Btu/hr = 34.2 lb/hr x 8,760 hrs/yr x ton/2,000 lb = 149.80 tpy CO > SER 100 tpy CO

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[48] US EPA AP-42, Chapter 1: External Combustion Sources, Table 1.6-1. EMISSION FACTORS FOR PM FROM WOOD RESIDUE COMBUSTION, Source Category: Wet wood with PM Control Device – Mechanical Collector ($PM_{2.5}$ EF = 0.12 (filterable) + 0.017 (condensible) lb/million Btu)

[49] US EPA AP-42, Chapter 1: External Combustion Sources, Table 1.6-1. EMISSION FACTORS FOR PM FROM WOOD RESIDUE COMBUSTION, Source Category: All Fuels with PM Control Device – Electrostatic Precipitator ($PM_{2.5}$ EF = 0.035 (filterable) + 0.017 (condensible) lb/million Btu)

[50] US EPA AP-42, Chapter 1: External Combustion Sources, Section 1.6.4 Controls. ESPs are employed when collection efficiencies above 90 percent are required. When applied to wood-fired boilers, ESPs are often used downstream of mechanical collector precleaners which remove larger-sized particles. Collection efficiencies of 90 to 99 percent for PM have been observed for ESPs operating on wood-fired boilers.

[51] Biomass Energy Resource Center (BERC) for Particulate Matter Emissions-Control Options for Wood Boiler Systems, https://www.biomasscenter.org/images/stories/FSE_PM_Emissions.pdf for $PM_{2.5}$ ESP CE of 90%.

[52] Ibid 41 (CO EF = 0.60 lb/million Btu)

CO emission rate = 0.24 lb/million Btu[53] x 57 million Btu/hr = 13.68 lb/hr x 8,760 hrs/yr x ton/2,000 lb = 59.92 tpy CO < SER 100 tpy CO

3. Wood fuel silo (ID No. ES-WCS-2) controlled by cyclone (ID Nos. CD-C5)

Per Form B of the latest application submittal, the proposed wood fuel silo emission source description is: Wood fuel silo (ID No. ES-WCS-2); and under describe in detail the emission source process: Waste Wood Collection System for Boiler 3 (fuel).

The proposed wood fuel silo will emit particulates during the loading of wood waste (sawdust) from the sawmill. Per Form B expected operating schedule is 24 hours/day; 7 days/week; 52 weeks/year. Per Form B9, the maximum design capacity is **7.2** tons per hour (tph) based on maximum hourly heat input to Boiler 3 assuming a wood heating value of 3,940 Btu/lb for green wood sawdust per Form B1 (Boiler 3):

$$57\ \frac{million\ Btu}{hr} * \frac{lb}{3,940\ Btu} * \frac{1{,}000{,}000\ Btu}{million\ Btu} * \frac{ton}{2{,}000\ lb} = 7.23\ \frac{ton}{hr}\ sawdust$$

$$7.23\ \frac{ton}{hr}\ sawdust * 1.0\ \frac{lb\ PM}{ton\ sawdust} = 7.23\ \frac{lb\ PM}{hr}$$

$$7.23\ \frac{lb\ PM}{hr} * \frac{ton}{2{,}000\ lb} * 8{,}760\ \frac{hrs}{yr} = 31.67\ \frac{ton}{yr}\ PM$$

Using the above methodology and values, the applicant's numbers, as presented in the summary table below were duplicated except for $PM_{2.5}$ as discussed. The application submittals used two different heat contents, listed below:

Form B1 for the proposed biomass boiler (ID No. B3):

Fuel Characteristics (Complete all that are applicable)
Fuel Type Specific Btu Content
Green Wood Saw Dust 3940

Table C-5.1 – Annual emissions from Wood-fired Boilers calculations uses 3,981 Btu/lb.

The previous application submittal dated February 25, 2019 used 3,981 on both Form B1 and in Table B-5.1.

No basis for those heating values was provided. Thus, the above calculation was revised using DAQ's approved heating value of 4,500 Btu/lb.[54] This default fuel heating value will be used

[53] Ibid 39 (CO EF = 0.24 lb/million Btu)
[54] US EPA AP-42, Chapter 1: External Combustion Sources, Section 1.6.1 General. Heating values for this (wood) residue range from about 4,500 British thermal units/pound (Btu/lb) of fuel on a wet, as-fired basis, to about 8,000 Btu/lb for dry wood. The moisture content of as-fired wood is typically near 50 weight percent for the pulp, paper and lumber industries and is typically 10 to 15 percent for the furniture industry.

throughout this review to calculate the facility's emissions where applicable (Refer to PSD Avoidance condition in Section V.C.14). Revised calculations to determine the maximum design capacity for permitting of the proposed wood fuel silo and emission rates are provided below:

$$57\ \frac{million\ Btu}{hr} * \frac{lb}{4{,}500\ Btu} * \frac{1{,}000{,}000\ Btu}{million\ Btu} * \frac{ton}{2{,}000\ lb} = 6.33\ \frac{ton}{hr}\ sawdust$$

Thus, the permitted maximum capacity of the proposed wood fuel silo will be 6.3 tph, not 7.2 tph as presented in the application.

Form B9 also indicates the wood fuel silo is controlled. Per Form C4 a cyclone is used to control emissions from transfer of sawdust to Boiler 3 Wood Fuel Silo (ID No. ES-WCS-2). Per Form C4, control efficiencies (CE) for a cyclone are based on DAQ factors; however, the default CE for $PM_{2.5}$ is 10%, not 40% as presented on Form C4 of the application. The before and after control PM emission rates from Form C4 are listed below based on the application:

Values from Application based on 3,940 Btu/lb heating value					
Pollutant	Before Control Emission Rate (lb/hr)	**Form B – PTE before controls or limit (tpy)**	Cyclone CE per DAQ[55]	After Control Emission Rate (lb/hr)	**Form B – PTE after controls or limit (tpy)**
Total PM	**7.23**	31.57	85	1.08	4.73
PM_{10}	2.60	11.86	40	1.56	6.82
$PM_{2.5}$	0.795	3.47	10	~~0.48~~ 0.72	~~2.08~~ 3.14

Form B of the application has the source of emission factors listed as AIRS. Table C-9: Wood Fuel Silo Emissions provides the following EFs used for the wood fuel silos:

Emission Factors[56]			
Per AIRS	PM	1.0	lb PM per ton sawdust
SCC-3-07-008-03	PM_{10}	0.36	lb PM_{10} per ton sawdust
Fire Database	$PM_{2.5}$	0.11	lb $PM_{2.5}$ per ton sawdust

Based on a permitted maximum capacity for the proposed wood fuel silo of 6.33 tph expected particulate (PM) emissions are calculated as follows:

$$6.33\ \frac{ton}{hr}\ sawdust * 1.0\ \frac{lb\ PM}{ton\ sawdust} = 6.33\ \frac{lb\ PM}{hr}$$

$$6.33\ \frac{lb\ PM}{hr} * \frac{ton}{2{,}000\ lb} * 8{,}760\ \frac{hrs}{yr} = 27.74\ \frac{ton}{yr}\ PM$$

[55] NC DAQ Woodworking Calculator Revision C July 2007 – Default Control Device Efficiencies - Cyclone
[56] Consistent with US EPA EF Tools and Georgia-Pacific Wood Products LLC, Talladega Sawmill PSD Permit Application

Revised calculations based on 4,500 Btu/lb heating value, EF per AIRS and Cyclone CE per DAQ				
Pollutant	Before Control Emission Rate (lb/hr)	**PTE before controls or limit (tpy)**	After Control Emission Rate (lb/hr)	**PTE after controls or limit (tpy)**
Total PM	**6.33**	27.74	0.95	4.16
PM_{10}	2.28	9.98	1.37	5.99
$PM_{2.5}$	0.697	3.05	0.63	2.75

4. Planer and miscellaneous wood handling sources

The increase in annual lumber production will increase particulate emission ($PM/PM_{10}/PM_{2.5}$) at the following unmodified but affected existing sources: planer mill (include planing of rough lumber and byproduct material collection, conveyance and storage), trim saw and wood hog, wood fuel silo and roads. The revised PM, PM_{10} and $PM_{2.5}$ EFs and CE's for the planer mill, sawmill and trim saw, and hog wood waste collection systems are based on engineering estimates from NCASI, EPA and DAQ guidance. The most recent submittal corrected erroneous cyclone CE and uses DAQ guidance for accepted cyclone CEs as presented in the table above for the proposed wood fuel silo.

This submittal changed future projected throughput to 265,411 thousand BF (MBF) and "wet basis" adjustment of 50% (because after kiln) changed to a 15% moisture content (MC) adjustment and shavings rate assumption changed from 0.20 to 0.18 (basis per application is facility production data). Per DAQ guidance,[57] 80% of sawing and planing emissions generated are greater than (>) 100 micrometers in aerodynamic particle size and not considered regulated. In addition, rough sawing and sanding produce approximately 20% wood waste; thus, the 0.20 shaving rate is acceptable. During a couple of telephone conversations with Mr. Deyo, this review engineer indicated that based on reviews of other applications of similar facilities, no adjust for a "wet basis" after the kiln had been made. In addition, the NCASI Special Report[58] provided by the applicant as the basis for the EF in lb/ODT does not indicate an adjustment for MC. Per the application kilns dry lumber to approximately 19% moisture. Based on revised Table C-7: Emissions from Planer Mill, 15% MC was used to be conservative because kiln dried lumber has a MC between 15-19% after the kilns. Before an adjust of 50% "wet basis" MC was made which is erroneous. Based on historical information, lumber normally comes in at approximately 50% MC. This proposed calculation methodology (if DAQ allows the MC adjustment and/or 0.18 shavings rate assumption) determines whether PM tpy emissions from the project exceeds the SER of 25 tpy [refer to calculations in Section V.C.8. under PSD below (PM >25tpy) and Table 1 projected emissions increase per the application from the project of 24.99 tpy PM]. The proposed PM EFs from NCASI's Special Report are summarized in the table below. Per NCASI's Special Report, the "Uncontrolled" EF is following a product cyclone. There is no discussion on adjustments (i.e., adjust for MC) since the planer is after the kiln and the EFs are in lb/ODT. The applicant references the definition in MACT DDDD, for

[57] NC DAQ Wood, Generation and Combustion of "Waste" Guidance – Estimating Emissions From Generation and Combustion of "Waste" Wood – Draft July 15, 1998

[58] NCASI Wood Products Air Quality Technical Information Document, Special Report No. 08-01, May 2008, Table 8.1 Uncontrolled Filterable Particulate Emissions from Miscellaneous Sources

ODT. ODT is defined in MACT DDDD as tons of wood dust dried until all of the moisture in the wood is removed, which is not the case at this lumber mill.

Pollutant	**Emission rate (median) – NCASI Special Report (2008)** Product – Lumber; Source Description - Planer	**Units**
Total PM	1.20	lb/ODT
PM10	0.32	
PM2.5	0.064	

Per Table C-7, example calculations are:

Emissions (tpy) = Shavings (ODT/yr) * Emission Factor (lb/ODT) / (2,000 lb/ton)
Emissions (lb/hr) = Maximum 3 Kiln Drying Capacity (39 MBF/hr) * Shavings Production Rate (ODT/MBF) * Emission Factor (lb/ODT)

PM emissions calculations based on the various approaches of 0.20 (DAQ approved) and 0.18 shavings production rate and/or an adjustment for MC are presented below:

1.20 ~~lb~~/~~ODT~~ * [265,411 ~~MBF~~/yr * **0.20** shavings production rate (~~ton wood waste~~/~~MBF~~)] * ton/2,000 ~~lb~~ = **31.85 tpy PM** based on DAQ guidance

1.20 lb/ODT * [265,411 MBF/yr * **0.18** shavings production rate] * ton/2,000 lb = **28.66 tpy PM** based on revised shaving production rate and no MC adjustment

Adjusted for MC of 15% and revised shavings rate of 0.18 as presented in Table C-7: Emissions from Planer Mill:

PM: 1.20 lb/ODT * [265,411 MBF/yr * **0.18** shavings production rate] * (1 – 15/100) * ton/2,000 lb = **24.36 tpy**

For this PSD project, PM emissions from the planer mill will be based on DAQ guidance.

PM emissions increases from other affected, yet unmodified sources are discussed in more detail under 15A NCAC 02D .0530 below under PAE (Section V.C.8.b.).

C. Regulatory review for applicable rules associated with this PSD application:

The following regulatory discussion includes Federal and State regulatory requirements for applicable regulations as they pertain to this application for all proposed changes, including annual kiln throughput increases, new emission sources and production increases from sources upstream and downstream of the kilns.

1. 15A NCAC 02D .0503 – Particulates from Fuel Burning Indirect Heat Exchangers

This rule applies to emissions of particulate matter from the combustion of a fuel that are discharged from any stack or chimney into the atmosphere. This Rule applies to installations in which fuel is burned for the purpose of producing heat or power by indirect heat transfer. Fuels

include those such as coal, coke, lignite, peat, natural gas, and fuel oils, but exclude wood and refuse not burned as a fuel. When any refuse, products, or by-products of a manufacturing process are burned as a fuel rather than refuse, or in conjunction with any fuel, this allowable emission limit shall apply.

The No. 2 ultra-low sulfur fuel oil-fired boiler (ID No. Boiler4) is subject to this regulation. For a heat input between any two consecutive heat inputs stated in the table provided in regulation 02D .0503, the allowable emissions of PM shall be calculated by the following equation:

$E = 1.090\ xQ^{-0.2594}$

Where:

E = allowable emissions limit for particulate matter in lb/million Btu; and
Q = maximum heat input in million Btu/hour

The maximum heat input, Q, is calculated as "…the sum of maximum heat input of all fuel burning indirect heat exchangers at a plant site which are in operation, under construction, or permitted…." Therefore, Q is calculated as the sum of the maximum heat input of Boiler 1, Boiler 2, and Boiler 4:

$Q = \Sigma\ [\text{max heat input}]_{\text{(Boiler 1, Boiler 2, and Boiler 4)}}$
$= 44.5 \text{ million Btu/hr} + 28.69 \text{ million Btu/hr} + 32.66 \text{ million Btu/hr}$
$= 105.85 \text{ million Btu/hr}$

Therefore, the allowable PM limit for the No. 2 fuel oil boiler 4 is calculated as follows:

$E = 1.090 \text{ x } [105.85 \text{ million Btu/hr}]^{-0.2594}$
$E = 0.325 \text{ lb PM/million Btu}$

Using AP-42[59], the total PM lb/hr expected for Boiler 4 is equivalent to:

$$\left(\frac{2\ lb\ Filterable\ PM}{1{,}000\ gal} + \frac{1.3\ lb\ Condensible\ PM}{1{,}000\ gal}\right) * \frac{1{,}000\ gal}{140\ million\ Btu} * \frac{32.66\ million\ Btu}{hour} = 0.7708\ total\ PM\ \frac{lb}{hr}$$

$$0.77\ total\ PM\ \frac{lb}{hr} * \frac{hr}{32.66\ million\ Btu} = 0.02357\ \frac{lb\ PM}{million\ Btu}$$

Due to the large margin of compliance expected for Boiler 4, there are no monitoring, recordkeeping, or reporting requirements associated with regulation 02D .0503 when firing No. 2 fuel oil. The boiler will continue to comply with the above limit and there is no change to the testing, monitoring, record keeping and reporting requirements for this regulation.

[59] US EPA AP-42, Chapter 1: External Combustion Sources, Section 1.3, Fuel Oil Combustion; Table 1.3-1. CRITERIA POLLUTANT EMISSION FACTORS FOR FUEL OIL COMBUSTION and Table 1.3-2. CONDENSABLE PARTICULATE MATTER EMISSION FACTORS FOR OIL COMBUSTION

2. 15A NCAC 02D .0504 – Particulates from Wood Burning Indirect Heat Exchangers

This rule applies to installations in which wood is burned for the primary purpose of producing heat or power by indirect heat transfer. Pursuant to 2D .0504(c), emissions of particulate matter (PM) from the combustion of wood shall not exceed the allowable emissions of PM provided in the table found in 02D .0504, except for a heat input between any two consecutive heat inputs stated in the table provided, the allowable emissions of PM shall be calculated by the equation:

$E = 1.1698 * Q^{-0.2230}$

Where:

E = allowable emissions limit for particulate matter in lb/million Btu; and
Q = maximum heat input in million Btu/hour

The maximum heat input, Q, is calculated as "…the sum of maximum heat input of all fuel burning indirect heat exchangers at a plant site which are in operation, under construction, or permitted…." Therefore, Q is calculated as the sum of the maximum heat input of Boiler 1, Boiler 2, Boiler 4 and Boiler 3:

$Q = \Sigma [\text{max heat input}]_{\text{(Boiler 1, Boiler 2, Boiler 4 and Boiler3)}}$
$= 44.5 \text{ million Btu/hr} + 28.69 \text{ million Btu/hr} + 32.66 \text{ million Btu/hr} + 57 \text{ million Btu/hr}$
$= 162.85 \text{ million Btu/hr}$

Therefore, the allowable PM limit for the proposed wood-fired boiler 3 is calculated as follows:

$E = 1.1698 * Q^{-0.2230}$
$= 0.3757 \text{ lb/million Btu}$
$= 0.376 \text{ lb/million Btu heat input.}$

The proposed wood-fired boiler (ID No. ES-Boiler3) and existing wood-fired boilers (ID Nos. B1 and Boiler2) are subject to the following allowable emission limits for PM:

Emission Source ID No.	Maximum Heat Input (million Btu/hr)	Allowable Emission Limit (lb/million Btu)	Expected Emissions (lb/million Btu)
ES-B1	44.5	0.50	0.107[60]
ES-Boiler2	28.69	0.449	0.217[61]
ES-Boiler3	57	0.376	0.217[62]

Emissions of PM from the combustion of wood that are discharged from these sources into the atmosphere shall not exceed the allowable limits (lb/million Btu) as summarized above. There is no increase in the hourly boiler rating of the existing boilers and thus the above emissions

[60] Ibid 37
[61] Ibid 38
[62] Ibid 39

standards remain the same. The existing boilers will continue to comply with the above standards and the new boiler will be required to comply with the above standard based on the permitted maximum heated capacity. There is no change to the testing, monitoring, recordkeeping and reporting requirements for this regulation.

Per DAQ policy, all wood-fired boilers will be tested for initial compliance upon commencing operation and at least once every 5 years to demonstrate continued compliance.

Based on source testing to date, the two existing wood-fired boilers are in compliance with this regulation as presented in the summary table above.

3. 15A NCAC 02D .0512 – Particulates from Wood Products Finishing Plants

This standard establishes particulate matter requirements for the wood products industry from the working, sanding, or finishing of wood. Particulate emissions shall be controlled by properly designed collection systems such that a violation of the ambient air quality standards does not occur beyond property lines. This regulation applies to all wood processing activities at this facility. This proposed modification will increase production; thus, proportionally increase PM from the following unmodified but affected sources: log processing (e.g., log debarking and cut-up), planer mill, trim saw and wood hog, wood fuel silo, and wood waste collection operations.

The facility will comply with this regulation by providing and maintaining adequate ductwork and collectors on the existing planer mill and wood waste (sawdust) collection operations (ID Nos. ES-PM, ES-WCS, ES-SH) and associated cyclones (ID Nos. CD-C3, CD-C2, CD-C4, respectively).

The application proposes a new wood (sawdust) fuel silo (ID No. ES-WCS-2) controlled by cyclone (ID Nos. CD-C5) as discussed in Section V.B.3. above that will be subject to this standard.

4. 15A NCAC 2D .0515 – Particulate from Miscellaneous Industrial Processes

This regulation sets a standard for particulate matter emissions from any industrial process for which no other emission control standard is applicable. The allowable emission rates for PM from any stack, vent, or outlet, resulting from these industrial processes shall not exceed the level calculated with the equation below for process rates less than or equal to 30 tons per hour (tph):

$$E = 4.10(P)^{0.67}$$

For process rates greater than 30 tph, the allowable emission rates for PM shall not exceed the level calculated with the following equation:

$$E = 55.0(P)^{0.11} - 40$$

For both equations:

E = the maximum allowable emission rate for PM in pounds per hour (lb/hr); calculated to three significant figures, and
P = equals the process rate in tons per hour (tph)

Process rate means the total weight of all materials introduced into any specific process that may cause any emission of PM. Solid fuels charged are considered as part of the process weight, but liquid and gaseous fuels and combustion air are not. For a cyclical or batch operation, the process rate is derived by dividing the total process weight by the number of hours in one complete operation from the beginning of any given process to the completion thereof, excluding any time during which the equipment is idle. For a continuous operation, the process rate is derived by dividing the process weight for a typical period of time by the number of hours in that typical period of time.

This rule only applies to the three steam heated lumber kilns located at Troy Lumber:

Per Form B9 for each of the three kilns, the maximum design capacity (MBF/hr) of dried lumber is 13 MBF/hr.[63] The revised application submittal received on April 1, 2020 provides the following calculation in Appendix G of allowable PM emission rates for Kilns 1, 2, and 3 with a comparison to the maximum hourly PM emission rates from these kilns as follows:

Source	Process Rate (MBF/hr)	lb wood/BF Factor	Process Rate (tph)	Emissions Limit (lb/hr)	Troy Emissions (lb/hr) Appendix C, Table C-6.2
Kiln 1	13	2.5	32,500	132.45	0.287
Kiln 2	13	2.5	32,500	132.45	0.287
Kiln 3	13	2.5	32,500	132.45	0.287

Using the information provided in Appendix G in the application, the process rate per kiln is calculated below:

$$13\ \frac{MBF}{hr} * 2.5\ \frac{lb\ wood}{BF} * 1{,}000\ \frac{BF}{MBF} * \frac{ton}{2{,}000\ lb} = 16.25\ \frac{ton}{hr}$$

Appendix G indicates the process rate is 32,500 tph, greater than 30 tph and uses the appropriate equation for processes greater than 30 tph. No basis was provided for the 2.5 lb wood/BF factor. Based a review of DAQ Guidance documents, the density of southern pine is estimated to be 2.6 pounds per BD-FT[64] and emission estimation spreadsheets provided the typical lb/bd-ft of yellow pine as 2.5.[65] This information supports the above calculations, resulting in the tph process rate of 16.25, not 32,500 tph. If you multiply the process rate (MBF/hr) provided in Appendix G by the 2.5 lb wood/BF it equates to:

13,000 BF/hr * 2.5 lb wood/BF = 32,500 lb wood/hr * ton/2,000 lb = 16.25 tph

[63] Ibid 14
[64] Ibid 57: 1 Board foot = 2.6 pounds (pine)
[65] NC DAQ Woodworking Emissions Calculator Revision C (July 2007); Input screen: typical lb/BF yellow pine 2.5

Based on the processing rate of 16.25 tph, using the equation for process rates less than 30 tph:

$E = 4.10(P)^{0.67} = 4.10(16.25)^{0.67} =$ 26.549 lb/hr

Per DAQ's Wood Kiln Emissions Calculator, the PM EF[66] for steam heated (southern pine) lumber kilns is 0.02231 lb/MBF; thus, hourly expected emissions of PM based on 13 MBF/hr is:

$$13\ \frac{MBF}{hr} * 0.02231\ \frac{lb\ PM}{MBF} = 0.287\ \frac{lb}{hr}\ PM$$

Allowable PM emissions rate of 26.549 lb/hr is much greater than the 0.287 lb/hr expected emissions rate; hence, compliance is indicated.

Based on the review of a similar PSD application[67] for a lumber mill in NC, the following weight rate was used for determining compliance with 02D .0515:

Per University of Tennessee, Institute of Agriculture publication, Table 3 - Log weight table and MBF conversion factors for Southern pine[68] for an 8 inch (8") diameter log, the weight per MBF is 14.1 tons/MBF average for all log lengths.

14.1 tons/MBF * 13 MBF/hr = 183.3 tph process rate per kiln

Using the equation for process rates greater than 30 tph as indicated in Appendix G of:

$E = 55.0(P)^{0.11} - 40 = 55.0(183.3)^{0.11} - 40 = 57.568$ lb/hr

Allowable PM emissions rate of 57.568 lb/hr is greater than the 0.287 lb/hr expected emissions rate; hence, compliance is indicated.

Since the allowable emission rates based on either calculation above is greater than the expected emission rate of 0.287 lb/hr, the restart of kiln #2, as well as the increase in production for the two existing kilns (#1 and #3) will always be in compliance with this regulation.

5. 15A NCAC 02D .0516 – Sulfur Dioxide Emissions from Combustion Sources

Emissions of sulfur dioxide from any source of combustion that is discharged from any vent, stack or chimney shall not exceed 2.3 pounds of sulfur dioxide (SO_2) per million Btu input. SO_2 formed by the combustion of sulfur in fuels, wastes, ores, and other substances shall be included when determining compliance with this standard.

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[66] Ibid 30

[67] Jordan Lumber & Supply, Co. (Application No. 6200015.18A)

[68] https://extension.tennessee.edu/publications/documents/sp748.pdf (Table 3 - Log weight table and MBF conversion factors for Southern pine).

A source subject to an emission standard for sulfur dioxide in Rules .0524, .0527, .1110, .1111, .1205, .1206, .1210, or .1211 of this Subchapter shall meet the standard in that particular rule instead of the 2.3 lb SO_2/million Btu standard of this Rule. Fuel combustion sources subject to SO_2 emission standards under new source performance standards (NSPS) per 02D .0524 or maximum achievable control technology (MACT) standards per 02D .1111 are required to meet the NSPS or MACT standards instead of this regulation.

- Boiler 1 pre-dates NSPS Dc[69], yet subject to the Boiler MACT. However, the unit is not subject to SO_2 emission limits under the Boiler MACT; thus, subject to 02D .0516 limits.
- Boiler 2 is subject to NSPS Dc and the Boiler MACT, yet less than 30 million Btu/hr. Therefore, the unit is not subject to SO_2 emission limits under NSPS Dc or the Boiler MACT; thus, subject to 02D .0516 limits.
- Boiler 3 is subject to NSPS Dc and the Boiler MACT. However, the unit is not subject to SO_2 emission limits under NSPS Dc or the Boiler MACT; thus, subject to 02D .0516 limits.
- Boiler 4 is subject to NSPS Dc and the Boiler MACT (per compliance option to use ultra-low sulfur liquid fuel per 40 CFR 63.7515(h)) SO_2 emission limits; thus, <u>not subject to 02D .0516 limits.</u>

The existing wood-fired boilers (ID Nos. B1 and Boiler2) and proposed wood-fired boiler (ID No. Boiler3) will only be burning wood (green sawdust). Per AP-42, SO_2 EF[70] for Bark/bark and wet wood/wet wood fired boiler and Dry wood-fired boilers is <u>0.025 lb/million Btu</u>. Therefore, a comparison of AP-42 EFs for expected emissions from all wood-fired boilers subject to 02D .0516 are less than the allowable emissions limit of 2.3 lb SO_2/million Btu. Compliance is expected.

<u>Monitoring/Recordkeeping/Reporting</u>
SO_2 emissions from firing wood will always be below the limit allowed under 02D .0516. Therefore, no monitoring, recordkeeping or reporting (MRR) is required for SO_2 emissions from the firing of wood (saw dust) fuel in these sources.

No change to the existing wood-fired boilers MRR requirements is necessary as a result of this modification. The proposed wood-fired boiler will be subject to the same MRR requirements as the existing wood-fired boilers.

6. 15A NCAC 02D .0521 Control of Visible Emissions

The intent of this Rule is to prevent, abate and control emissions generated from fuel burning operations and industrial processes where an emission can reasonably be expected to occur, except during startup, shutdowns, and malfunctions approved according to procedures set out in Rule 02D .0535.

For sources manufactured after July 1, 1971, visible emissions shall not be more than 20 percent opacity when averaged over a six-minute period. However, except for sources required to

[69] Per review for Troy's Initial Title V Permit (issued permit No. 02330T12), the wood-fired boiler (ID No. ES-B1) is not subject to NSPS Dc since it was placed into operation in April 1986 prior to NSPS Dc (June 9, 1989).
[70] Ibid 41

comply with Paragraph (g) of this Rule, six-minute averaging periods may exceed 20 percent opacity if: (1) No six-minute period exceeds 87 percent opacity; (2) No more than one six-minute period exceeds 20 percent opacity in any hour; and (3) No more than four six-minute periods exceed 20 percent opacity in any 24-hour period.

Paragraph (g) to 02D .0521 applies to sources required to install, operate, and maintain continuous opacity monitoring systems (COMS).

This Rule shall apply to all fuel burning sources and to other processes that may have a visible emission. However, sources subject to a visible emission standard in Rules .0506, .0508, .0524, .0543, .0544, .1110, .1111, .1205, .1206, .1210, .1211, or .1212 of this Subchapter shall meet that standard instead of the standard contained in this Rule.

The existing sources located at Troy Lumber are subject to a visible emissions (VE) standard of no more than 20 percent opacity when averaged over a six-minute period. This PSD project is not expected to affect compliance with this rule for existing sources.

- Boiler 1 pre-dates NSPS Dc, yet subject to the Boiler MACT. However, the Boiler MACT does not have a VE emission limits; thus, subject to 02D .0521 limits.
- Boiler 2 is subject to NSPS Dc, yet less than 30 million Btu/hr. Therefore, the unit is not subject to VE emission limits under NSPS Dc. The unit is subject to the Boiler MACT. However, the Boiler MACT does not have a VE emission limits; thus, subject to 02D .0521 limits.

The new No. 2 fuel oil-fired boiler and proposed wood-fired boiler are subject to NSPS Dc and the Boiler MACT.

- Boiler 3 is subject to NSPS Dc and the Boiler MACT. The Boiler MACT does not have a VE emission limits; however, the unit is subject to VE standards under NSPS Dc.
- Boiler 4 is subject to NSPS Dc and the Boiler MACT. The Boiler MACT does not have a VE emission limits; however, the unit is subject to VE standards under NSPS Dc.

Under the Boiler MACT, opacity is not an emissions limit. Opacity serves as a surrogate indicator of PM emissions, but was not intended by the EPA as an emission limit under the Boiler MACT rule. Rather, it was intended to be an operating limit, which is established on a source-specific basis.

7. 15A NCAC 02D .0524 – New Source Performance Standards (40 CFR 60, Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units)

§60.40c Applicability and delegation of authority.
(a) Except as provided in paragraphs (d), (e), (f), and (g) of this section, the affected facility to which this subpart applies is each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input

capacity of 29 megawatts (MW) (100 million British thermal units per hour (million Btu/hr)) or less, but greater than or equal to 2.9 MW (10 million Btu/hr).
[72 FR 32759, June 13, 2007, as amended at 74 FR 5090, Jan. 28, 2009; 77 FR 9461, Feb. 16, 2012]

- Existing wood-fired boiler (ID No. ES-B1)[71] pre-dates NSPS Dc (placed into operation April 1986).
- Existing boiler (ID No. ES-Boiler2) is not being modified and will continue to comply with this regulation by recording the amount of wood combusted daily (less than 30 million Btu/hr).
- New No. 2 fuel oil fired boiler (ID No. ES-Boiler4) will be subject to NSPS Dc as currently permitted (See reviews for issued Permits No. 02330T23 and 02330T24 for more details).
- Proposed wood-fired boiler (ID No. ES-Boiler3) will be subject to NSPS Dc as discussed below.

The proposed wood-fired boiler (Boiler3) has a maximum design capacity of 57 million Btu/hr and will combust Green Wood Dust per Form B1.

§60.41c Definitions.
As used in this subpart, all terms not defined herein shall have the meaning given them in the Clean Air Act and in subpart A of this part.
…
Wood means wood, wood residue, bark, or any derivative fuel or residue thereof, in any form, including but not limited to sawdust, sanderdust, wood chips, scraps, slabs, millings, shavings, and processed pellets made from wood or other forest residues.
[72 FR 32759, June 13, 2007, as amended at 74 FR 5090, Jan. 28, 2009; 77 FR 9461, Feb. 16, 2012]

§60.42c Standard for sulfur dioxide (SO2).
(a) Except as provided in paragraphs (b), (c), and (e) of this section, on and after the date on which the performance test is completed or required to be completed under §60.8, whichever date comes first, the owner or operator of an affected facility that combusts only coal shall neither: cause to be discharged into the atmosphere from the affected facility any gases that contain SO2 in excess of 87 ng/J (0.20 lb/MMBtu) heat input or 10 percent (0.10) of the potential SO2 emission rate (90 percent reduction), nor cause to be discharged into the atmosphere from the affected facility any gases that contain SO2 in excess of 520 ng/J (1.2 lb/MMBtu) heat input. If coal is combusted with other fuels, the affected facility shall neither: cause to be discharged into the atmosphere from the affected facility any gases that contain SO2 in excess of 87 ng/J (0.20 lb/MMBtu) heat input or 10 percent (0.10) of the potential SO2 emission rate (90 percent reduction), nor cause to be discharged into the atmosphere from the affected facility any gases that contain SO2 in excess of the emission limit is determined pursuant to paragraph (e)(2) of this section.
…

[71] Ibid 69

(h) For affected facilities listed under paragraphs (h)(1), (2), (3), or (4) of this section, compliance with the emission limits or fuel oil sulfur limits under this section may be determined based on a certification from the fuel supplier, as described under §60.48c(f), as applicable.
(1) Distillate oil-fired …
(2) Residual oil-fired …
(3) Coal-fired …
(4) Other fuels-fired affected facilities with heat input capacities between 2.9 and 8.7 MW (10 and 30 MMBtu/h).

The proposed boiler is greater than 30 million Btu/hr and combust wood only. Paragraphs §60.42c(a) through (g) and §60.42c(i)&(j) only address affected facilities that combust coal and oil or coal in combination with other fuels. Paragraph §60.42c(h) above only addresses affected facilities with heat input capacities between 10 and 30 million Btu/hr; thus, the proposed boiler is not subject to the SO_2 limitations of NSPS Dc because the rule is silent in regards to wood-fired boilers greater than 30 million Btu/hr.

§60.43c Standard for particulate matter (PM).
(c) On and after the date on which the initial performance test is completed or required to be completed under §60.8, whichever date comes first, no owner or operator of an affected facility that combusts coal, wood, or oil and has a heat input capacity of 8.7 MW (30 MMBtu/h) or greater shall cause to be discharged into the atmosphere from that affected facility any gases that exhibit greater than 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity. Owners and operators of an affected facility that elect to install, calibrate, maintain, and operate a continuous emissions monitoring system (CEMS) for measuring PM emissions according to the requirements of this subpart and are subject to a federally enforceable PM limit of 0.030 lb/MMBtu or less are exempt from the opacity standard specified in this paragraph (c).
(d) The PM and opacity standards under this section apply at all times, except during periods of startup, shutdown, or malfunction.
(e)(1) On and after the date on which the initial performance test is completed or is required to be completed under §60.8, whichever date comes first, no owner or operator of an affected facility that commences construction, reconstruction, or modification after February 28, 2005, and that combusts coal, oil, wood, a mixture of these fuels, or a mixture of these fuels with any other fuels and has a heat input capacity of 8.7 MW (30 MMBtu/h) or greater shall cause to be discharged into the atmosphere from that affected facility any gases that contain PM in excess of 13 ng/J (0.030 lb/MMBtu) heat input, except as provided in paragraphs (e)(2), (e)(3), and (e)(4) of this section. …

The proposed boiler is greater than 30 million Btu/hr, combust wood only and will be constructed after February 28, 2005. Paragraphs §60.43c(c) through (e) apply. The application did not provide details in regards to how the facility plans to comply with NSPS Dc; thus, it is assumed that the limits in paragraph §60.43c(e)(1) above apply. A facility that wishes to install CEMS for PM must submit and have an approved ESP predictive model (approved by the permitting authority) per §60.47c(f); thus, the proposed boiler is subject to the PM and opacity limitations of NSPS Dc as follows:

- 20 percent opacity, and
- 0.030 lb/MMBtu heat input

As discussed above, the total PM emission rate[72] from existing Boiler 2 post multicyclones will be used to estimate PM emissions for proposed Boiler 3. The proposed boiler will be controlled by 2 multicyclones followed by an ESP. Expected PM emissions are estimated using the controlled emissions rate from the mechanical collector and applying an ESP CE of 90%[73] as calculated below:

$$0.217 \frac{\text{lb PM}}{\text{million Btu}} * [(100 - 90)/100] = 0.0217 \frac{\text{lb PM}}{\text{million Btu}}$$

Compliance with NSPS Dc standard of 0.030 lb/MMBtu heat input for PM is expected.

§60.45c Compliance and performance test methods and procedures for particulate matter.
(a) The owner or operator of an affected facility subject to the PM and/or opacity standards under §60.43c shall conduct an initial performance test as required under §60.8, and shall conduct subsequent performance tests as requested by the Administrator, to determine compliance with the standards using the following procedures and reference methods, except as specified in paragraph (c) of this section. …

Visible Emission Monitoring for Boilers ≥ 30 million Btu per hour and firing coal, residual oil, or wood and exempt from requiring COMS under 60.47c(c), (d), (e) or (f):

§60.47c Emission monitoring for particulate matter.
(a) Except as provided in paragraphs (c), (d), (e), and (f) of this section, the owner or operator of an affected facility combusting coal, oil, or wood that is subject to the opacity standards under §60.43c shall install, calibrate, maintain, and operate a continuous opacity monitoring system (COMS) for measuring the opacity of the emissions discharged to the atmosphere and record the output of the system. The owner or operator of an affected facility subject to an opacity standard in §60.43c(c) that is not required to use a COMS due to paragraphs (c), (d), (e), or (f) of this section that elects not to use a COMS shall conduct a performance test using Method 9 of appendix A-4 of this part and the procedures in §60.11 to demonstrate compliance with the applicable limit in §60.43c by April 29, 2011, within 45 days of stopping use of an existing COMS, or within 180 days after initial startup of the facility, whichever is later, and shall comply with either paragraphs (a)(1), (a)(2), or (a)(3) of this section. …

…
(f) An owner or operator of an affected facility that is subject to an opacity standard in §60.43c(c) is not required to operate a COMS provided that the affected facility meets the conditions in either paragraphs (f)(1), (2), or (3) of this section.
(1) The affected facility uses a fabric filter (baghouse) as the primary PM control device and, the owner or operator operates a bag leak detection system to monitor the performance of the fabric filter according to the requirements in section §60.48Da of this part.

[72] Ibid 39 (Total PM EF = 0.217 lb/million Btu)
[73] Ibid 50

(2) The affected facility uses an ESP as the primary PM control device, and the owner or operator uses an ESP predictive model to monitor the performance of the ESP developed in accordance and operated according to the requirements in section §60.48Da of this part.
(g)(1) Except as provided under paragraphs (g)(2) and (g)(3) of this section, the owner or operator of each affected facility shall record and maintain records of the amount of each fuel combusted during each operating day.

Thus, the new boiler (ID No. ES-Boiler3) controlled by multicyclones followed by an ESP is not exempt from the requirement to operate a COMS for two reasons:

- The ESP is not the primary PM control device, and
- The facility has not submitted an ESP predictive model to monitor the performance of the ESP for approval.

However, pursuant to §60.45c the initial performance evaluation shall be completed no later than 180 days after the date of initial startup of the affected facility, as specified under §60.8 of subpart A. The facility is also required to record and maintain records of the amount of each fuel combusted during each operating day.

§60.48c Reporting and recordkeeping requirements.
(a) The owner or operator of each affected facility shall submit notification of the date of construction or reconstruction and actual startup, as provided by §60.7 of this part. This notification shall include:
(1) The design heat input capacity of the affected facility and identification of fuels to be combusted in the affected facility.
…
(b) The owner or operator of each affected facility subject to the SO2 emission limits of §60.42c, or the PM or opacity limits of §60.43c, shall submit to the Administrator the performance test data from the initial and any subsequent performance tests and, if applicable, the performance evaluation of the CEMS and/or COMS using the applicable performance specifications in appendix B of this part.
(c) In addition to the applicable requirements in §60.7, the owner or operator of an affected facility subject to the opacity limits in §60.43c(c) shall submit excess emission reports for any excess emissions from the affected facility that occur during the reporting period and maintain records according to the requirements specified in paragraphs (c)(1) through (3) of this section, as applicable to the visible emissions monitoring method used.
…
(11) If fuel supplier certification is used to demonstrate compliance, records of fuel supplier certification as described under paragraph (f)(1), (2), (3), or (4) of this section, as applicable. In addition to records of fuel supplier certifications, the report shall include a certified statement signed by the owner or operator of the affected facility that the records of fuel supplier certifications submitted represent all of the fuel combusted during the reporting period.
(f) Fuel supplier certification shall include the following information:
(1) For distillate oil:
(2) For residual oil:
(3) For coal:

(4) For other fuels:
(i) The name of the supplier of the fuel;
(ii) The potential sulfur emissions rate or maximum potential sulfur emissions rate of the fuel in ng/J heat input; and
(iii) The method used to determine the potential sulfur emissions rate of the fuel.
(g)(1) Except as provided under paragraphs (g)(2) and (g)(3) of this section, the owner or operator of each affected facility shall record and maintain records of the amount of each fuel combusted during each operating day.
…
(j) The reporting period for the reports required under this subpart is each six-month period. All reports shall be submitted to the Administrator and shall be postmarked by the 30th day following the end of the reporting period.

The appropriate monitoring, recordkeeping and reporting requirements were added to the permit.

8. 15A NCAC 02D .0530 – Prevention of Significant Deterioration

The purpose of the Rule is to implement a program for the prevention of significant deterioration (PSD) of air quality as required by 40 CFR 51.166. PSD does not prevent sources from increasing emissions. Instead, PSD is designed to:

- protect public health and welfare
- preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value
- insure that economic growth will occur in a manner consistent with the preservation of existing clean air resources
- assure that any decision to permit increased air pollution in any area to which this section applies is made only after careful evaluation of all the consequences of such a decision and after adequate procedural opportunities for informed public participation in the decision making process

Congress first established the New Source Review (NSR) program as part of the 1977 Clean Air Act Amendments and modified the program in the 1990 Amendments. The NSR program requires pre-construction review prior to obtaining a permit. The basic goal of NSR is to ensure that the air quality in clean (i.e. attainment) areas does not significantly deteriorate while maintaining a margin for future industrial growth. The NSR regulations focus on industrial facilities, both new and modified, that create large increases in the emission of certain pollutants. PSD permits are a type of NSR permitting requirement for new major sources or sources making a major modification in an attainment area.

Under PSD requirements, all major new or modified stationary sources of air pollutants as defined in Section 169 of the Federal Clean Air Act (CAA) must be reviewed and permitted prior to construction by EPA or permitting authority, as applicable, in accordance with Section 165 of CAA. A "major stationary source" is defined as any one of 28 named source categories, which emits or has a potential to emit 100 tons per year of any “regulated NSR pollutant” or any other

stationary source, which emits or has the potential to emit 250 tons per year of any PSD regulated pollutant.

Pursuant to the Federal Register notice on February 23, 1982, North Carolina (NC) has full authority from the EPA to implement the PSD regulations in the State effective May 25, 1982. NC's State Implementation Plan (SIP)-approved PSD regulations have been codified in 15A NCAC 2D .0530, which implement the requirements of 40 CFR 51.166. The Code of Federal Regulations (CFR) in 15A NCAC 2D .0530 are incorporated by reference unless a specific reference states otherwise. The version of the CFR incorporated in 15A NCAC 2D .0530 is that as of July 1, 2014 and does not include any subsequent amendments or editions to the referenced material. The PSD regulations applicable to this project are the regulations in 15A NCAC 2D .0530 in effect as of the final permit issuance date. The latest revisions to 15A NCAC 2D .0530 became effective on September 1, 2017.

Operations at this facility are categorized under Standard Industrial Classification (SIC) code 2421 for sawmills and planing mills. The raw material for dimensional lumber, the principle product, is southern pine logs.

The PSD regulations apply to major modifications at major stationary sources, which are considered to be those sources belonging to any one of the 28 source categories listed in the regulations that has the potential to emit more than 100 tons per year of any PSD-regulated compound, or any other source which has the potential to emit more than 250 tons per year of any PSD compound. This facility is currently classified as a major stationary source under Prevention of Significant Deterioration (PSD) regulations. Lumber mill facilities do not belong to one of the 28 listed categories. This facility does emit greater than 250 tons per year of a PSD-regulated air compound (VOC, actual emissions of VOC in 2017 was 306.18 tpy) and is therefore an existing major source under Prevention of Significant Deterioration (PSD) permitting program, as provided the North Carolina Administrative Code Title 15A, Sub-Chapter 02D, Section .0530 (15A NCAC 02D .0530).

A PSD applicability analysis was performed for the proposed project to determine if any regulated compounds would be subject to PSD review (See discussion under Section III above). The facility did a project analysis for the emissions of PM/PM_{10}/$PM_{2.5}$, VOC, CO, SO_2, NO_x, Pb, and GHG or CO_{2e}.

a. Baseline Actual Emissions (BAE)

North Carolina’s definition of BAE differs from the Federal PSD rules as specified in 15A NCAC 02D .0530(b)(l). Specifically, 15A NCAC 02D .0530(b)(l)(A) includes “For an existing emissions unit, baseline actual emissions means the average rate, in tons per year, at which the emissions unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the five year period immediately preceding the date that a complete permit application is received by the Division for a permit required under this Rule…”

Per Troy Lumber’s PSD preconstruction air permit application received March 12, 2019 for this project, two years of production data (2016 and 2017) were selected as the baseline period.

However, based on a review of the original application submittal and a historical review of the facility's operations, as well as the previous PSD status change from Major to Minor by accepting a PSD Avoidance condition in permit revision 02330T18, it was determined that the selected baseline period in 2016 and 2017 is not allowed to exceed the PSD avoidance throughput limit of 119.5 MMBF/yr accepted and placed in Troy Lumber's permit on July 29, 2015 upon issuance of permit 02330T18.

Pursuant to 15A NCAC 02D .0530(b)(l)(A)(iii), for an existing emission unit (other than an electric utility steam generating unit), the average rate shall be adjusted downward to exclude any emissions that would have exceeded an emission limitation with which the major stationary source must currently comply.

An additional information requests was sent to Troy Lumber on April 24, 2019 indicating that the baseline emissions determination for the selected baseline period (2016 and 2017) is not allowed to exceed the avoidance throughput limit of 119.5 MMBF/yr for the baseline calculations.

Troy submitted an amended application received by the Division on June 14, 2019 with the baseline emissions revised and capped at the kiln's permitted annual throughput limit of 119.5 MMBF/yr. However, the emissions were not capped for all sources throughout the entire application for the baseline emissions calculations. In addition, there were questions regarding the EFs, CEs and methodologies used. Thus, additional information requests were sent to the facility in addition to teleconferences.

The latest application submittal received by the Division on April 1, 2020, under Section 1 states baseline emissions were determined as the average annual emissions for the consecutive 24-month period from calendar years 2016 and 2017 for the facility operations and capped at 119.5 MBF (Refer to Attachments B and C of the latest application submittal).

The following information was taken from Table C-1: Troy Lumber Company Throughputs of the application which provides the inputs used in the revised application. The electronic version of this spreadsheet was modified (i.e., average column added, future actual production numbers removed for baseline discussion) as presented below for this review:

Operation or Process	2016	2017	Average of 2016 & 2017	Units
Logs Processed	507,789.05	499,920.57	503,854.81	Tons
Log Preparation - Bark Produced	23,529.85	23,203.59	23,366.72	Tons
Log Preparation - Chips Produced	138,952.07	147,905.97	143,429.02	Tons
Shavings Produced	21,539.81	21,981.82	21,760.81	Tons
Sawdust Produced	61,005.04	59,804.96	60,405.00	Tons
Sawmill Throughput	62,653.89	61,654.60	62,154.24	Tons
Boiler Fuel Usage (B1/B2)	40,630.00	37,872.85	39,251.42	Tons
Boiler 1 Fuel Usage	196,687.73	151,911.25	174,299.49	Million Btu/yr
Boiler 2 Fuel Usage	126,808.33	149,632.36	138,220.35	Million Btu/yr

Operation or Process	2016	2017	Average of 2016 & 2017	Units
Planer Throughput	21,539.81	21,981.82	21,760.81	Tons
Wood Drying Kilns Throughput (Kiln #1, Kiln #2, Kiln #3)[74]	**119,500,000**	**119,500,000**	**119,500,000**	BF

Baseline emissions are presented below by pollutant and emission source based on the following existing sources permitted during the baseline (2016 – 2017) period:

Emission Source ID No.	Emission Source Description
ES-B1	Existing wood-fired underfired stoker boiler with a pre-heater (44.5 million Btu/hr maximum heat input) with flyash reinjection controlled by two multicyclones (ID Nos. CD-B-MC1 and CD-B-MC2)
ES-Boiler2	Existing wood-fired underfired stoker boiler (28.69 million Btu/hr maximum heat input) with flyash reinjection controlled by two multicyclones (ID Nos. CD-Boiler2-1 and CD-Boiler2-2)
ES-KILN-1	Steam-heated indirect-fired continuous lumber drying kiln (87.6 MMBF/yr maximum potential lumber charge capacity)
ES-KILN-2 (only part of 2016)[75]	Steam-heated indirect-fired batch lumber drying kiln (60 MMBF/yr maximum potential lumber charge capacity)
ES-KILN-3 (only part of 2016)[76]	Steam-heated indirect-fired continuous lumber drying kiln (87.6 MMBF/yr maximum potential lumber charge capacity)
ES-PM	Planer mill wood waste collection system
ES-SH	Trim saw and wood hog waste collection system
ES-WCS	Sawmill wood waste collection system discharging to wood fuel silo
Wood waste	Dry Wood Shavings Truck Loading
Fugitive	Paved and Unpaved Traffic

VOC emissions, expected from the kilns and boilers, are summarized below for BAE:

- Kilns:

An approved VOC EF of 4.09 lb VOC (as pinene)/MBF[77] was used for determining BAE capped at 119,500 MBF/yr, pursuant to 15A NCAC 02D .0530(b)(l)(A)(iii) per the less than 250 tpy VOC PSD avoidance condition in Troy's current permit and the application submittal received by the Division on June 14, 2019. The latest submittal received on April 1, 2020 uses a VOC EF of 4.78 for BAE calculations, which has only been approved for PAE. DAQ previously discussed with the facility that BAE must use the approved VOC EF of 4.09 as calculated below:

[74] Ibid 2, 4 and 5
[75] Ibid 4 and 5
[76] Ibid 4 and 5
[77] Ibid 2

$$119{,}500\ \frac{MBF}{yr} * 4.09\ \frac{lb\ VOC}{MBF} * \frac{ton}{2{,}000\ lb} = \ 244.38 \frac{tons}{yr}\ VOC$$

- Boilers:

VOC emissions from existing wood-fired boilers (ID Nos. ES-B1 and ES-BoilerB2) where included in the less than 250 tpy VOC PSD avoidance condition based on their PTE of 3.31 tons of VOC per year for Boiler B1; and 2.14 tons of VOC per year for Boiler B2.[78]

The pounds of sawdust per year of wet wood burned in the two existing wood-fired boilers (ES-B1 and ES-Boiler2), tons of sawdust and annual boiler fuel heat input capacity[79] during the baseline years were confirmed and are provided below from Table C-5.1: Annual Emissions from Wood-Fired Boilers - Criteria Pollutants and Hazardous Air Pollutants (and Table C-1):

Emission Source ID No.	2016	2017	2016	2017	2016	2017
	Pounds sawdust/yr		Tons sawdust/yr		Million Btu/yr	
ES-B1	49,406,613	38,159,068	24,703.31	19,079.53	196,688	151,911
ES-Boiler2	31,853,387	37,586,626	15,926.69	18,793.31	126,808	149,632
Total tons per year sawdust			**40,630**	**37,872.84**		

However, per DAQ Wood Waste Combustion Calculator, the default heating value of 4,500 British thermal units/pound (Btu/lb)[80] of fuel on a wet basis should be used absent approved site-specific data (refer to discuss under Section V.B.3. above for wood fuel silo and Section V.C.11 below under Toxics). Form B of the application for Boiler 3 list 3,940 Btu/lb and Table C-5.1 uses 3,981 Btu/lb as the heating value. VOC emissions from the boilers are calculated using the EPA/DAQ approved heating value of 4,500 Btu/lb as follows:

$$49{,}406{,}613\ \frac{lb\ sawdust}{yr\ (B1\ -\ 2016)} * 4{,}500 \frac{Btu}{lb}\ * \frac{million\ Btu}{1{,}000{,}000\ Btu}\ =\ 222{,}329.76\ \frac{million\ Btu}{yr}$$

The annual boiler fuel heat input capacity was revised for baseline emission calculations summarized in the following table:

Emission Source ID Nos.	2016	2017	Average
	Million Btu/yr using 4,500 Btu/lb		
ES-B1	222,329.76	171,715.81	197,022.78
ES-Boiler2	143,340.24	169,139.82	156,240.03

$$0.017\ \frac{lb\ VOC}{million\ Btu}\ * 222{,}329.76\ \frac{million\ Btu}{yr\ (B1 -\ 2016)} * \frac{ton}{2{,}000\ lb}\ =\ \ 1.889\ tpy\ VOC$$

[78] Ibid 2

[79] Based on fuel heating value of 3,981 Btu per pound per Table C-5.1.

[80] Ibid 54 and NC DAQ Wood Waste Combustion Emissions Calculator Revision K default heating value (Btu/lb). In addition, one of the restrictions included in the Troy's previous permit (Permit No. 02330T16) to assure compliance with the emission rates provided in the Director's Call application (see discussion under Toxics).

Emission Source ID Nos.	Emission Factor		Emission Rate (tpy)	
			2016	2017
ES-B1	0.017	lb/ million Btu[81]	1.89	1.46
ES-Boiler2			1.22	1.44
ES-KILN-1, ES-KILN-2 (only part of 2016), ES-KILN-3	4.09	lb/MBF[82]	244.38	244.38
Total VOC emissions during baseline period (tpy)			**247.48**	**247.28**
Average VOC emissions during baseline period (tpy)			**247.38**	

VOC emissions during baseline period are less than the 250 tpy PSD avoidance condition.

NOx[83] emissions, expected from the boilers only, are summarized below for BAE:

Emission Source ID Nos.	Emission Factor		Emission Rate (tpy)	
			2016	2017
ES-B1	0.22	lb/million Btu[84]	24.46	18.89
ES-Boiler2			15.77	18.60
Total NOx emissions during baseline period (tpy)			**40.22**	**37.49**
Average NOx emissions during baseline period (tpy)			**38.86**	

CO[85] emissions, expected from the boilers only, are summarized below for BAE:

Emission Source ID Nos.	Emission Factor		Emission Rate (tpy)	
			2016	2017
ES-B1	0.17	lb/million Btu[86]	18.90	14.60
ES-Boiler2	0.24	lb/million Btu[87]	17.20	20.30
Total CO emissions during baseline period (tpy)			**36.10**	**34.89**
Average CO emissions during baseline period (tpy)			**35.50**	

[81] Ibid 44
[82] Ibid 2
[83] Per the Sector Notebook Project – Lumber and Wood Products, SIC Code 24, Southern Lumber Manufacturing Association, September 1995 the only NOx emissions expected from a Lumber Production Facility is from the boilers and/or direct-fired dry kilns. No NOx emissions are expected from steam heated kilns (due to boilers providing steam).
[84] Ibid 41
[85] Per the Sector Notebook Project – Lumber and Wood Products, SIC Code 24, Southern Lumber Manufacturing Association, September 1995 the only CO emissions expected from a Lumber Production Facility is from the boilers and/or direct-fired dry kilns. No CO emissions are expected from steam heated kilns (due to boilers providing steam).
[86] Ibid 37
[87] Ibid 38

SO_2[88] emissions, expected from the boilers only, are summarized below for BAE:

Emission Source ID Nos.	Emission Factor		Emission Rate (tpy)	
			2016	2017
ES-B1	0.025	lb/million Btu[89]	2.78	2.15
ES-Boiler2			1.79	2.11
Total SO_2 emissions during baseline period (tpy)			**4.57**	**4.26**
Average SO_2 emissions during baseline period (tpy)			**4.42**	

Pb emissions, expected from the boilers only, are summarized below for BAE:

Emission Source ID Nos.	Emission Factor		Emission Rate (tpy)	
			2016	2017
ES-B1	$4.8x10^{-5}$	lb/million Btu[90]	0.00534	0.00412
ES-Boiler2			0.00344	0.00406
Totals Pb emissions during baseline period (tpy)			**0.00878**	**0.00818**
Average Pb emissions during baseline period (tpy)			**0.00848**	

CO_{2eq}[91] emissions, expected from the boilers only, are summarized below for BAE:

The Greenhouse Gas (GHG) emissions were calculated using the procedures published in 40 CFR 98 – Mandatory Greenhouse Gas Reporting, Subpart C – General Stationary Fuel Combustion Sources. Per Table C-1 to 40 CFR 98 Subpart C, the default high heat value for "wood and wood residuals" is 17.48 million Btu/ton, and the default CO_2 EF is 93.80 kg/million Btu. Per Table C-2 to 40 CFR 98 Subpart C, the default EFs for "wood and wood residuals" are $7.2x10^{-2}$ kg/million Btu for CH_4 and $3.6x10^{-3}$ kg/million Btu for N_2O.

The CO_2, CH_4, N_2O emissions are converted to a CO_{2eq} basis by multiplying by the respective global warming potentials from 40 CFR 98 Subpart A, Table A-1. The global warming potentials for CO_2, CH_4, N_2O are 1, 25, 298, respectively.

$$93.80\ \frac{kg\ CO2}{million\ Btu} * 2.20462 \frac{lb}{kg} = 206.79 \frac{lb}{million\ Btu}\ CO2$$

[88] Per the Sector Notebook Project – Lumber and Wood Products, SIC Code 24, Southern Lumber Manufacturing Association, September 1995 the only SO_2 emissions expected from a Lumber Production Facility is from the boilers and/or direct-fired dry kilns. No SO_2 emissions are expected from steam heated kilns (due to boilers providing steam).
[89] Ibid 41
[90] Ibid 45
[91] Ibid 28

$$206.79\frac{lb}{million\ Btu}\ CO2 * 222{,}329.76\ \frac{million\ Btu}{yr\ (B1-\ 2016)} *\ \frac{ton}{2{,}000\ lb}\ =\ 22{,}987.78\ \text{tpy CO2}$$

$$\text{CO2 equivalent (B1} -\ 2016) = (22{,}987.78 * 1) + (1.78 * 25) + (0.878 * 298) = 22{,}990.4$$

Emission Source ID Nos.	Emission Factor		Emission Rate (tpy)	
			2016	2017
ES-B1	206.79	lb/million Btu CO_2	22,987.78	17,754.56
	0.016	lb/million Btu CH_4	1.78	1.37
	0.0079	lb/million Btu N_2O	0.878	0.678
	CO_2 equivalent		22,990.44	17,756.61
ES-Boiler2	206.79	lb/million Btu CO_2	14,820.66	17,488.21
	0.016	lb/million Btu CH_4	1.15	1.35
	0.0079	lb/million Btu N_2O	0.566	0.668
	CO_2 equivalent		14,822.38	17,490.23
Totals CO_{2eq} emissions during baseline period (tpy)			**37,812.82**	**35,246.84**
Average CO_{2eq} emissions during baseline period (tpy)			**36,529.83**	

PM, PM_{10} and $PM_{2.5}$ emissions, expected from the kilns, boilers, planer mill and other PM affected sources are summarized below for BAE:

- Kilns:

An approved PM EF of 0.02231 lb PM/MBF[92] based on NCASI and DAQ Wood Kilns Emission Calculator was used for BAE capped at 119,500 MBF/yr:

$$119{,}500\ \frac{MBF}{yr} * 0.02231\ \frac{lb\ PM}{MBF} * \frac{ton}{2{,}000\ lb} =\ 1.333\frac{tons}{yr}\ PM$$

A review of a similar PSD application[93] for a lumber mill with direct-fired kilns, the ratio of PM to PM_{10} and $PM_{2.5}$, indicates that PM_{10} is assumed to be approximately 60% PM (0.013 lb PM_{10}/MBF):

$$119{,}500\ \frac{MBF}{yr} * 0.013386\ \frac{lb\ PM10}{MBF} * \frac{ton}{2{,}000\ lb} =\ 0.7998\ \frac{tons}{yr}\ PM10$$

$PM_{2.5}$ is assumed to be approximately 50% PM (0.011 lb $PM_{2.5}$/MBF). Table C-6.1 only references the DAQ Wood Kiln Calculator, which only provides a total PM EF. Absent available data for indirect-fired kilns, the $PM_{2.5}$ EF provided in the application of 0.005 lb/MBF will be used [$PM_{2.5}$ = 0.67 tpy versus 0.30 tpy].

[92] Ibid 30
[93] Weyerhaeuser NR Company - Plymouth Lumber (Application No. 5900107.17A)

- Boilers:

Table C-5.1 uses 3,981 Btu/lb versus 4,500 Btu/lb fuel heating value[94]; thus, PM emissions from the boilers are calculated as follows:

$$49{,}406{,}613\ \frac{lb\ sawdust}{yr\ (B1-\ 2016)} * 4{,}500 \frac{Btu}{lb}\ * \frac{million\ Btu}{1{,}000{,}000\ Btu}\ =\ 222{,}329.76\ \frac{million\ Btu}{yr}$$

$$0.107\ \frac{lb\ PM}{million\ Btu}\ * 222{,}329.76\ \frac{million\ Btu}{yr\ (B1-\ 2016)} * \frac{ton}{2{,}000\ lb}\ =\ \ 11.895\ tpy\ PM$$

Emission Source ID Nos.	Emission Factor		Emission Rate (tpy)	
			2016	2017
ES-B1	0.107	lb/million Btu[95]	11.90	9.19
ES-Boiler2	0.217	lb/million Btu[96]	15.55	18.35
Total PM/PM10 emissions during baseline period (tpy)			**27.45**	**27.54**
Average PM/PM10 emissions (tpy)			**27.49**	

Per the application, Table C-5.1 PM_{10} is assumed to be PM.

As discussed under Section V.B. above, the application indicates that the $PM_{2.5}$ EF is from site-specific data. However, no testing has been performed for $PM_{2.5}$. Due to no data to support the proposed $PM_{2.5}$ EF used for all 3 wood-fired boilers of 0.007 lb/million Btu provided in the application (Table C-5.1), emission estimates were calculated based on the control scenario that existed at baseline. Both existing boilers were each controlled by two multicylones; thus, $PM_{2.5}$ emissions are estimated using the AP-42 $PM_{2.5}$ EF below:

- Wet wood with mechanical collector[97]:

[(0.12 filterable + 0.017 condensible) lb/million Btu] = 0.137 lb/million Btu

$$0.137\ \frac{lb\ PM2.5}{million\ Btu}\ *\ 222{,}329.76\ \frac{million\ Btu}{yr\ (B1-\ 2016)} * \frac{ton}{2{,}000\ lb}\ =\ 15.23\ tpy\ PM2.5$$

[94] Ibid 54
[95] Ibid 37
[96] Ibid 38
[97] Ibid 48

Emission Source ID Nos.	$PM_{2.5}$ Emission Factor		Emission Rate (tpy)	
			2016	2017
ES-B1	0.137	lb/million Btu	15.23	11.76
ES-Boiler2			9.82	11.59
Total PM2.5 emissions during baseline period (tpy)			**25.05**	**23.35**
Average PM2.5 emissions (tpy) during baseline period (tpy)			**24.20**	

- Planer Mill:

$PM/PM_{10}/PM_{2.5}$ emissions calculated using facility planer throughput rates provided in Table C-1 of the application for baseline years and NCASI EFs are summarized below:

Planer Throughput	2016	2017	Tons
	21,539.81	**21,981.82**	

$$1.20\ \frac{lb\ PM}{ODT}\ *\ 21{,}981.82\ \frac{tons\ woodwaste}{yr\ (2017)}\ *\frac{ton}{2{,}000\ lb} = 13.19\ tpy\ PM$$

Pollutant	NCASI EF (lb/ODT)[98]	PM (tpy)		PM10 (tpy)		PM2.5 (tpy)	
		2016	2017	2016	2016	2017	2016
Total PM	1.20	12.92	13.19				
PM10	0.32			3.45	3.52		
PM2.5	0.064					0.69	0.70

Planer emissions summarized above are without an adjust for moisture content of 15% as presented in Table C-7 (refer to Section V.B.4. above).

- Trim Saw and Wood Hog:

PM/PM_{10} emissions as presented in Table C-8 were verified. The facility used DAQ and NCASI methodology. The control device efficiencies provided with the first application submittals were erroneous. This revised application submittal uses DAQ approved cyclone CEs[99] of 85% for PM and 40% for PM_{10}.

$$119{,}500{,}000\ \frac{BF}{yr}\ *\ 0.001744\ \frac{lb\ PM\ generated}{BF} * \frac{ton}{2{,}000\ lb} * \left(1 - \frac{85}{100}\right) = 15.63\ tpy\ PM$$

$$119{,}500{,}000\ \frac{BF}{yr}\ *\ 0.0000489\ \frac{lb\ PM10\ generated}{BF} * \frac{ton}{2{,}000\ lb} * \left(1 - \frac{40}{100}\right)$$

$$= 1.75\ tpy\ PM10$$

[98] Ibid 58
[99] Ibid 55

- Wood Fuel Silo:

PM/PM_{10}/$PM_{2.5}$ emissions as presented in Table C-9 were verified, except $PM_{2.5}$. The facility used DAQ and EPA methodology. The control device efficiencies provided with the first application submittals were erroneous. This revised application submittal uses DAQ cyclone default CEs.[100] However, as presented under Section V.B.3. above, the applicant used an incorrect cyclone CE of 40% for $PM_{2.5}$ on Form C for WCS-2 controlled by CD-C5. That same CE error was carried through to Table C-9; thus, the emissions are calculated below using the correct default CE for $PM_{2.5}$ of 10% (CEs of 85% for PM, 40% for PM_{10} and 10% for $PM_{2.5}$).

Emission Factors[101]			
Per AIRS Database SCC-3-07-008-03	PM	1.0	lb PM per ton sawdust
	PM_{10}	0.36	lb PM_{10} per ton sawdust
Fire Database	$PM_{2.5}$	0.11	lb $PM_{2.5}$ per ton sawdust

Table C-1 sawdust produced in tons:

Sawdust Produced	**2016**	**2017**	**Tons**
	61,005.04	**59,804.96**	

$$1.0\ \frac{lb\ PM}{ton\ sawdust} * 61{,}005.04\ \frac{ton\ sawdust}{yr\ (2016)} * \frac{ton}{2{,}000\ lb} * \left(1 - \frac{85}{100}\right) = 4.58\ tpy\ PM$$

$$0.36\ \frac{lb\ PM10}{ton\ sawdust} * 61{,}005.04\ \frac{ton\ sawdust}{yr\ (2016)} * \frac{ton}{2{,}000\ lb} * \left(1 - \frac{40}{100}\right) = 6.59\ tpy\ PM10$$

$$0.11\ \frac{lb\ PM2.5}{ton\ sawdust} * 61{,}005.04\ \frac{ton\ sawdust}{yr\ (2016)} * \frac{ton}{2{,}000\ lb} * \left(1 - \frac{10}{100}\right) = 3.02\ tpy\ PM2.5$$

WCS	**2016 (tpy)**	**2017 (tpy)**	**Average (tpy)**
PM	4.58	4.49	4.535
PM_{10}	6.59	6.46	6.525
$PM_{2.5}$	3.02	2.96	2.99

- Dry Wood Shavings Truck Loading:

Per Section 1.4.6 Truck Loading, Transport and Diesel Tanks of the application, particulate emissions from truck loading are calculated using EFs from AP-42, Chapter 13 (product handling). Per Table C-10 of the application wood waste from trim saw, wood hog and planer mill is stored in a silo and loaded into trucks for sale. Dry wood shavings truck loading emission sources include: chip truck loading, bard and sawdust loading (including bark trim), bark and

[100] Ibid 55
[101] Ibid 56

sawdust transfer, shavings transfer and chips transfer. Wood waste will emit particulates during the loading and unloading of sawdust and wood residuals. No capacity information for the individual sources is provided (i.e., the maximum loading or unloading or transfer rates in tph).

The applicant has calculated a particulate EF using the equation for drop operations into storage piles found in AP-42, Chapter 13.2.4, Aggregate Handling and Storage Piles.[102] This is consistent with a similar PSD application for a wood fuel silo; however, to estimate emissions from the dry residual transfer system, unpublished NCASI factors were used for a pneumatic system transferring dry material (planer, sawdust and chipper shavings) through a cyclone.[103]

Either adding aggregate material to a storage pile or removing it usually involves dropping the material onto a receiving surface. Truck dumping on the pile or loading out from the pile to a truck with a front-end loader are examples of batch drop operations. Adding material to the pile by a conveyor stacker is an example of a continuous drop operation.

The applicant used the following equation and methodology:

$E = k(0.0032) * [(U/5)^{1.3} / (M/2)^{1.4}]$ (lb/ton)

Where:

E = Emission Factor (lb/ton)
k = Particle size multiplier (dimensionless); $k_{PM} = 0.74$; $k_{PM10} = 0.35$; and $k_{PM2.5} = 0.053$
U = Mean wind speed (miles/hr); U = 8.65 mph[104]
M = Material moisture content (%); M = 5%[105]

$E_{PM} = (0.74)(0.0032)[(8.65/5)^{1.3}/(5/2)^{1.4}] = 0.00134$ lb/ton
$E_{PM10} = (0.35)(0.0032)[(8.65/5)^{1.3}/(5/2)^{1.4}] = 0.00063$ lb/ton
$E_{PM2.5} = (0.053)(0.0032)[(8.65/5)^{1.3}/(5/2)^{1.4}] = 0.00010$ lb/ton

Tons transferred provided in Table C-10: Dry Wood Shavings Truck Loading where verified with Table C-1 inputs and calculations used in the electronic version of Table C-10 were checked. The $PM/PM_{10}/PM_{2.5}$ emission tables are summarized below and an example PM emissions calculation for chips transfer in tons for baseline year 2016 are presented below:

$$138{,}952\ tons\ chips\ transfer\ (2016)\ *\ 0.00134\ \frac{lb\ PM}{ton} * \frac{ton}{2{,}000\ lb} = 0.093\ tpy\ PM$$

[102] US EPA AP-42, Chapter 13: Miscellaneous Sources, Section 13.2.4 Aggregate Handling And Storage Piles
[103] Ibid 93
[104] US EPA Tanks Program, Version 4.09 per Section 1.4.6 of the application. As a check, the wind speed for Wilmington, NC listed in US EPA's AP-42, Chapter 7: Liquid Storage Tanks, Table 7.1-7. METEOROLOGICAL DATA (TAX, TAN, V, I , PA) FOR SELECTED U.S. LOCATIONS is 7.6 miles per hour annual average. Data for this table are 20-year averages for the years 1991 through 2010, only provided for Class I sites.
[105] US EPA AP-42, Chapter 13, Section 13.2.4.3 Predictive Emission Factor Equations, the moisture content ranges for the above equation are 0.25 - 4.8%. As worse case engineering estimate, 5% is acceptable due to the wood products industry not being one of the industries listed in the table, nor wood residual a listed material.

Emissions Source	Amount Transfer (Tons)	Calculated Emission Factors (lb/ton transfer)			Emissions TPY		
		PM	PM10	PM2.5	PM	PM10	PM2.5
Chip Truck Loading	138,952	0.00134	0.00063	0.00010	0.220	0.104	0.016
Bark and Sawdust Truck Loading (Including Bark Trim)	84,535	0.00134	0.00063	0.00010	0.057	0.027	0.004
Bark and Sawdust Transfer	84,535	0.00134	0.00063	0.00010	0.057	0.027	0.004
Shavings Transfer	21,540	0.00134	0.00063	0.00010	0.014	0.007	0.001
Chips Transfer	138,952	0.00134	0.00063	0.00010	0.093	0.044	0.007
PM/PM10/PM2.5 Total Emissions for 2016 (tpy)					**0.441**	**0.208**	**0.032**

Emissions Source	Amount Transfer (Tons)	Calculated Emission Factors (lb/ton transfer)			Emissions TPY		
		PM	PM10	PM2.5	PM	PM10	PM2.5
Chip Truck Loading	147,906	0.00134	0.00063	0.00010	0.220	0.104	0.016
Bark and Sawdust Truck Loading (Including Bark Trim)	83,009	0.00134	0.00063	0.00010	0.056	0.026	0.004
Bark and Sawdust Transfer	83,009	0.00134	0.00063	0.00010	0.056	0.026	0.004
Shavings Transfer	21,982	0.00134	0.00063	0.00010	0.015	0.007	0.001
Chips Transfer	147,906	0.00134	0.00063	0.00010	0.099	0.047	0.007
PM/PM10/PM2.5 Total Emissions for 2017 (tpy)					**0.445**	**0.210**	**0.032**

Average BAE of PM/PM_{10}/$PM_{2.5}$ from Dry Wood Shavings Truck Loading are provided below:

Baseline year	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
2016	0.441	0.208	0.032
2017	0.445	0.210	0.032
BAE Average	**0.443**	**0.209**	**0.032**

- Paved and Unpaved Traffic Emissions:

Based on the most recent application submittal received on April 1, 2020, per Section 1.4.6 Truck Loading, Transport and Diesel Tanks, particulate emissions from transport (roads) are calculated using EFs from AP-42, Section 13.2.1.

Per Table C-11: Paved and Unpaved Traffic Emissions - the applicant calculated fugitive dust emissions using Section 13.2 of AP-42[106]:

[106] US EPA AP-42, Chapter 13: Miscellaneous Sources, Section 13.2. Introduction to Fugitive Dust Sources: 13.2.1 – Paved Roads and 13.2.2 Unpaved Roads

- 13.2.1 - Paved Roads

Section 13.2.1.3 Predictive Emission Factor Equations
The quantity of particulate emissions from resuspension of loose material on the road surface due to vehicle travel on a dry paved road may be estimated using the following empirical expression:

$E = k(sL)^{0.91} * (W)^{1.02}$ Equation 1

Where:

E = particulate emission factor (having units matching the units of k)
k = particle size multiplier for particle size range and units of interest (see below)
sL = road surface silt loading (grams per square meter) (g/m2)
W = average weight (tons) of the vehicles traveling the road

PM	Particle Size Multiplier (k)	0.011	lb/VMT	Table 13.2.1-1
PM10		0.0022		
PM2.5		0.00054		

The precipitation correction term can be applied on a daily basis or an hourly basis. For the daily basis, Equation 1 becomes:

$Eext = [k(sL)^{0.91} * (W)^{1.02}] (1 – P/4N)$ Equation 2

Where:

k, sL, W, and S are as defined in Equation 1 and
Eext = annual or other long-term average emission factor in the same units as k
P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period
N = number of days in the averaging period (e.g., 365 for annual, 91 for seasonal, 30 for monthly)

Per Table C-11 applicant used Equation 2 above to calculate particulate EF in pounds per vehicle mile traveled (lb/VMT):

Particulate Emission Factors (Paved Roads)		
PM	0.1967	lb/VMT
PM10	0.03935	lb/VMT
PM2.5	0.009658	lb/VMT

The applicant then calculated the vehicle miles traveled (VMT) on paved roads per year:

Truck Travel Distances (at current production)*	Current	Days/yr of Truck Traffic	Trucks/day	Miles Travel	VMT/yr
Pine Logs	22,804	365	62	0.25	5701
Pine Logs (Pulpwood)	2,353	365	6	0.25	588
Bark	1,566	365	4	0.25	392
Chips/Sawdust/Shavings	9,621	365	26	0.1	962
Lumber	6,651	365	18	0.1	665
				Total Current Paved	**8,308**

$$8{,}308\ \frac{VMT}{yr} * 0.1967\ \frac{lb\ PM}{VMT} * \frac{ton}{2{,}000\ lb} = 0.82\ tpy\ PM\ Paved\ Roads$$

*Current emissions from paved roads used as BAE estimates:

Pollutant	TPY
PM	0.82
PM10	0.16
PM2.5	0.01

- 13.2.2 - Unpaved Roads

Section 13.2.2.1 General
When a vehicle travels an unpaved road, the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

13.2.2.2 Emissions Calculation And Correction Parameters
The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Field investigations also have shown that emissions depend on source parameters that characterize the condition of a particular road and the associated vehicle traffic. Characterization of these source parameters allow for "correction" of emission estimates to specific road and traffic conditions present on public and industrial roadways.

Per the electronic version of Table C-11, the applicant used the following equation:

$E = (k\ (s/12)^a\ (W/3)^b) \times [(365-P)/365)] \times (100\% - \text{Control Efficiency})$

The following empirical expressions may be used to estimate the quantity in pounds (lb) of size-specific particulate emissions from an unpaved road, per VMT:

For vehicles traveling on unpaved surfaces at industrial sites, emissions are estimated from the following equation:

$E = (k * (s/12)^a * (W/3)^b)$ Equation 1a

Where:

k, a, and b are empirical constants given below and
E = size-specific emission factor (lb/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)

PM	Particle Size Multiplier (k)	4.9	lb/VMT	Table 13.2.2-2
PM10		1.5		
PM2.5		0.15		
PM	Empirical Constant (a)	0.7	No units	
PM10		0.9		
PM2.5		0.9		
PM	Empirical Constant (b)	0.45		
PM10		0.45		
PM2.5		0.45		

The effect of routine watering to control emissions from unpaved roads is discussed in Section 13.2.2.3 - Controls. However, all roads are subject to some natural mitigation because of rainfall and other precipitation. The Equation 1a and 1b emission factors can be extrapolated to annual average uncontrolled conditions (but including natural mitigation) under the simplifying assumption that annual average emissions are inversely proportional to the number of days with measurable (more than 0.254 mm [0.01 inch]) precipitation:

Eext = E [(365-P)/365)] Equation 2

Where:

Eext = annual size-specific emission factor extrapolated for natural mitigation, lb/VMT
E = emission factor from Equation 1a or 1b
P = number of days in a year with at least 0.254 mm (0.01 in) of precipitation

A 50% CE was used for watering plant roads. However, no explanation of how the 50% CE was derived was provided.

The electronic version of Table C-11 uses Equation 1a and 2 above with a CE for watering roads to calculate particulate EF in lb/VMT:

Particulate Emission Factors (UnPaved Roads)		
PM	2.368	lb/VMT
PM10	0.601	lb/VMT
PM2.5	0.060	lb/VMT

The applicant then calculated the VMT on unpaved roads per year:

Truck Travel Distances (at current production)*	Current	Days/yr of Truck Traffic	Trucks/day	Miles Travel	VMT/yr
Pine Logs	22,804	365	62	0.01	228
Pine Logs (Pulpwood)	2,353	365	6	0.05	118
Bark	1,566	365	4	0.05	78
Chips/Sawdust/Shavings	9,621	365	26	0.01	96
Lumber	6,651	365	18	0.01	67
				Total Current Paved	**587**

$$587\ \frac{VMT}{yr} * 2.368\ \frac{lb\ PM}{VMT} * \frac{ton}{2{,}000\ lb} = 0.69\ tpy\ PM\ Unpaved\ Roads$$

*Current emissions from unpaved roads used as BAE estimates:

Pollutant	TPY
PM	0.69
PM10	0.18
PM2.5	0.18

Per the application, current two-year average used for Paved and Unpaved Traffic Emissions[107] for BAE are summarized below:

Pollutant	Paved Roads (tpy)	Unpaved Roads (tpy)	Fugitive (tpy)
PM	0.82	0.69	**1.51**
PM10	0.16	0.18	**0.34**
PM2.5	0.01	0.18	**0.19**

PM, PM_{10} and $PM_{2.5}$ emission totals are summarized in the following table for BAE:

Emission Source ID No(s).	PM (tpy)		PM10 (tpy)		PM2.5 (tpy)	
	2016	2017	2016	2017	2016	2017
ES-B1	11.90	9.19	11.90	9.19	15.23	11.76
ES-Boiler2	15.55	18.35	15.55	18.35	9.82	11.59
ES-KILN-1, ES-KILN-2 (only part of 2016), ES-KILN-3	1.33	1.33	0.80	0.80	0.30	0.30
ES-PM	12.92	13.19	3.45	3.52	0.69	0.70
ES-SH	15.63	15.63	1.75	1.75	0.00	0.00
ES-WCS	4.58	4.49	6.59	6.46	3.02	2.96

[107] Per previous application received on June 14, 2020, basis for PM ($PM/PM_{10}/PM_{2.5}$) EF – AP-42 Sections 13.2.1 and 13.2.2 using current two year average per Table B-3. The averages are the same as presented in Table C-11.

Emission Source ID No(s).	PM (tpy)		PM10 (tpy)		PM2.5 (tpy)	
	2016	**2017**	**2016**	**2017**	**2016**	**2017**
Wood waste (sawdust) - Dry Wood Shavings Truck Loading	0.441	0.445	0.208	0.210	0.032	0.032
Fugitive – Paved and Unpaved Roads	1.51		0.34		0.19	
Total PM/PM10/PM2.5 emissions during baseline period (tpy)	63.86	64.14	40.59	40.62	29.28	27.53
Average PM/PM10/PM2.5 emissions during baseline period (tpy)	63.99		40.60		28.41	

b. Projected Actual Emissions (PAE)

Pursuant to 40 CFR 51.166(b)(40)(i) Projected actual emissions means the maximum annual rate, in tons per year, at which an existing emissions unit is projected to emit a regulated NSR pollutant in any one of the 5 years (12-month period) following the date the unit resumes regular operation after the project, or in any one of the 10 years following that date, if the project involves increasing the emissions unit's design capacity or its potential to emit that regulated NSR pollutant, and full utilization of the unit would result in a significant emissions increase, or a significant net emissions increase at the major stationary source. (ii) In determining the projected actual emissions under paragraph (b)(40)(i) of this section (before beginning actual construction), the owner or operator of the major stationary source:
(a) Shall consider all relevant information, including but not limited to, historical operational data, the company's own representations, the company's expected business activity and the company's highest projections of business activity, the company's filings with the State or Federal regulatory authorities, and compliance plans under the approved plan; and
(b) Shall include fugitive emissions to the extent quantifiable, and emissions associated with startups, shutdowns, and malfunctions; and
(c) Shall exclude, in calculating any increase in emissions that results from the particular project, that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month period used to establish the baseline actual emissions under paragraph (b)(47) of this section and that are also unrelated to the particular project, including any increased utilization due to product demand growth; or,
(d) In lieu of using the method set out in paragraphs (b)(40)(ii)(a) through (c) of this section, may elect to use the emissions unit's potential to emit, in tons per year, as defined under paragraph (b)(4) of 40 CFR 51.166:

(4) Potential to emit means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable. Secondary emissions do not count in determining the potential to emit of a stationary source.

(39) Significant emissions increase means, for a regulated NSR pollutant, an increase in emissions that is significant (as defined in paragraph (b)(23) of 40 CFR 51.166) for that pollutant.

A significant emission increase is projected to occur if the sum of the "actual to projected actual" emissions increases and decreases from existing emission units at the site plus the "actual to potential" increases for the new boilers, the wood fuel silo and diesel storage tanks in addition to the restart of kiln #2, increase in annual lumber production and increases from affected, yet unmodified sources equals or exceeds the significance amount listed in 40 CFR 51.166(b)(23)(i) for a NSR regulated pollutant.

- PAE methodology used for this modification as described in the application:

Section 1 of the Application received on April 1, 2020: Troy Mill's total permitted drying capacity will increase from 175.2 million BF/yr to 265.41 million BF/yr. The increase in lumber production will also increase particulate emissions at the following unmodified but affected sources: Planer Mill, Trim Saw and Wood Hog, Wood Fuel Silo and Roads. The increase in lumber production will also result in an increase in boiler fuel usage which may be accommodated by any of the wood-fired boilers 1, 2 and 3.

Troy Lumber has calculated the maximum potential emissions resulting from the installation of proposed Boiler 3 (operating at full capacity 8,760 hours per year) and the increase in lumber production (operating at full capacity 8,760 hours per year) and existing boiler throughputs to determine that the project would result in emissions increases in excess of the SER for several pollutants (See Section 5.1 and Appendix B). Therefore, Troy Lumber is requesting the following permit limitations to limit future projected emissions of all pollutants other than VOC, to levels below PSD significance (i.e. facility has performed a "past actual vs. future projected" analysis using the permit limitations below):

- ❖ Maximum combined lumber throughput to Kilns 1, 2, and 3 of 265.41 million BF per year
- ❖ Maximum combined heat input to the all boilers of 669,731 million Btu per year

The analysis was performed by comparing BAE to potentials, then projected future actual emissions (PAE) pursuant to 40 CFR §51.166 and 15A NCAC 02D .0530 to determine the emissions increase due to the proposed project. The future projected emissions from this project, as limited by the proposed production and heat input limits detailed above, were then compared to the baseline emissions to determine if the project (under future projected (permitted) scenario) triggered a PSD review.

§52.21 Prevention of significant deterioration of air quality.

Per 40 CFR 52.21 (r) Source obligation (6):

(c) A description of the applicability test used to determine that the project is not a major modification for any regulated NSR pollutant, including the baseline actual emissions, the projected actual emissions, the amount of emissions excluded under paragraph (b)(41)(ii)(*c*) of

this section and an explanation for why such amount was excluded, and any netting calculations, if applicable.

Netting Analysis:
Net emissions change = emissions increases from the project, plus "creditable" emissions increases and decreases at the facility over the past 5 years. If net emissions change equals/exceeds the significance thresholds, there is a significant net emissions increase and NSR applies.

To calculate future project emissions, the post-project capacity of 265,410,662 BF/yr was used for the kilns, boilers, planer mill and other affected sources to calculate emission increases.

The increase in annual production from the currently permitted throughput of 175.2 MMBF/yr to 265.411 MMBF/yr will be achieved by restarting of existing batch kiln (#2) and conversion to a continuous kiln primarily to improve product quality, which is achieved through the more carefully controlled drying conditions of the continuous kiln. In addition, the facility plans to increase the capacity of the two existing operational kilns currently permitted at 87.6 MMBF/yr each. The revised application submittal received by DAQ on April 1, 2020, Form B's for each kiln indicates that all 3 kilns will have a maximum design capacity of 13 MBF/hr.

The "project emissions increases" have been calculated using the capped baseline actuals to future projected emissions calculation methodology for the affected sources. Because there is a net increase in capacity of all three kilns the capacity of post project kilns at this facility shall be permitted at the requested limit to avoid triggering PSD for other pollutants (please refer to 15A NCAC 02Q .0317 Avoidance Condition in Section V.C.14. below). The required steam will be provided from the existing three boilers, in addition to the proposed wood-fired boiler (with a restriction that only 3 boilers operate simultaneously) and the requested maximum combined heat input to the all boilers of 669,731 million Btu/yr per Section 1.5.2 of latest application.

The existing boilers collectively operate to provide steam to the kilns. The two existing wood-fired boilers (ID Nos. ES-B1 and ES-Boiler2) have capacities of 44.5 and 28.69 million Btu per hour maximum heat input, respectively; and one No. 2 oil-fired boiler (ID No. ES-Boiler4) rated at 32.66 million Btu per hour maximum heat input is utilized only when Boilers 1 and 2 are being serviced; therefore, the emissions from Boiler 4 will not be included in the PSD applicability calculations as discussed under Section V.B.2. above.[108] The emissions from the new wood-fired boiler (ID No. ES-Boiler3) will be calculated at the sources potential to emit.[109]

The following information was obtained from Table C-1: Troy Lumber Company Throughputs of the application which provides the inputs used in the latest application received by the Division on April 1, 2020. The electronic version of this spreadsheet was modified (i.e., average baseline column added, removed individual baseline values for 2016 & 2017, future actual production numbers remain) as presented below:

[108] Pursuant to 40 CFR 51.166(r)(6)
[109] Pursuant to 15A NCAC 02D .0530(b)(1)(B)

Operation or Process	Future Projected (Permitted) Production	Average of (2016 & 2017) Baseline	Units
Logs Processed	1,110,328	503,854.81	Tons
Log Preparation - Bark Produced	51,535	23,366.72	Tons
Log Preparation - Chips Produced	328,501	143,429.02	Tons
Shavings Produced	48,822	21,760.81	Tons
Sawdust Produced	**132,827**	60,405.00	Tons
Sawmill Throughput	136,935	62,154.24	Tons
Boiler Fuel Usage - (B1/B2) past actual and (B1/B2/B3) future actual	**84,116**	39,251.42	Tons
Boiler 1 Fuel Usage	**669,731**	174,299.49	Million Btu/yr
Boiler 2 Fuel Usage		138,220.35	Million Btu/yr
Boiler 3 Fuel Usage		N/A	
Planer Throughput	48,822	21,760.81	Tons
Wood Drying Kilns Throughput – (Kiln #1, Kiln #2, Kiln #3)[110]	**265,410,662**	**119,500,000**	BF

Future projected emissions are presented below by pollutant and emission source based on the following existing sources permitted during the baseline (2016 – 2017) period, revisions to permitted equipment since receipt of the original PSD application (i.e., installation of ESPs on two existing wood-fired boilers and installation of No. 2 fuel oil boiler) and proposed new sources (i.e., wood-fired boiler, wood fuel silo and tanks) as part of this project:

Emission Source ID Nos.	Emission Source Description
ES-B1	Existing wood-fired underfired stoker boiler with a pre-heater (44.5 million Btu/hr maximum heat input) with flyash reinjection controlled by two multicyclones (ID Nos. CD-B-MC1 and CD-B-MC2) followed by an electrostatic precipitator (ID No. CD-ESP-1)
ES-Boiler2	Existing wood-fired underfired stoker boiler (28.69 million Btu/hr maximum heat input) with flyash reinjection controlled by two multicyclones (ID Nos. CD-Boiler2-1 and CD-Boiler2-2) followed by an electrostatic precipitator (ID No. CD-ESP-2)
ES-Boiler3	Proposed wood-fired stoker boiler (57 million Btu per hour maximum heat input) with flyash reinjection controlled by two multicyclones (ID Nos. CD-Boiler3-1 and CD-Boiler3-2) followed by an electrostatic precipitator (ID No. CD-ESP-3)
ES-Boiler4	One ultra-low sulfur[111] distillate fuel oil-fired boiler (32.66 million Btu per hour maximum heat input) with primary and alternative operating scenarios
ES-KILN-1	Steam-heated indirect-fired continuous lumber drying kiln (13 MBF per hour dried lumber maximum design capacity)
ES-KILN-2	Steam-heated indirect-fired continuous lumber drying kiln (13 MBF per hour dried lumber maximum design capacity)

[110] Ibid 2, 4, 5 and current application
[111] Ibid 12

Emission Source ID Nos.	Emission Source Description
ES-KILN-3	Steam-heated indirect-fired continuous lumber drying kiln (13 MBF per hour dried lumber maximum design capacity)
ES-PM	Planer mill wood waste collection system
ES-SH	Trim saw and wood hog waste collection system
ES-WCS	Sawmill wood (sawdust) collection system discharging to wood fuel silo
ES-WCS-2	Proposed wood fuel silo – sawmill wood (sawdust) collection system for wood-fired Boiler 3
Wood waste	Dry wood shavings truck loading
Fugitive	Paved and unpaved traffic
IES-AST1 & IES-AST2	Two double-walled 3,000 gallon capacity No. 2 fuel oil above ground storage tanks
IES-AST3 & IES-AST4	Two double-walled 2,500 gallon capacity No. 2 fuel oil above ground storage tanks

PSD regulation under 15A NCAC 02D .0530 (k) states:

"When a particular source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification to emit a pollutant, such as a restriction on hours of operation, then the provisions of this Rule shall apply to the source or modification as though construction had not yet begun on the source or modification."

As part of this modification, Troy Lumber has requested to remove the existing PSD Avoidance condition for VOC emissions (i.e., Facility-wide limit for boilers B1 and B2 and Kiln 1 and Kiln 2) of less than 250 tons per year; and the total board feet of lumber processed not to exceed 119.5 million board feet per year; thus, using the PTE to establish PAE follows PSD regulations.

VOC emissions, expected from the kilns, boilers and tanks, are summarized below for PAE:

- Kilns:

Approved NCASI VOC EF of 4.78 lb VOC (as pinene)/MBF[112] was used for determining PAE capped at 265,411 MBF/yr for all 3 kilns, per requested limit to avoid triggering PSD for other pollutants:

$$265{,}411\ \frac{MBF}{yr} * 4.78\ \frac{lb\ VOC}{MBF} * \frac{ton}{2{,}000\ lb} = \ 634.33 \frac{tons}{yr}\ VOC$$

Per Section V.C.8.a. above, DAQ approved VOC EF of 4.09 lb VOC (as pinene)/MBF[113] was used for BAE capped at 119,500 MBF/yr which yields 244.38 tpy VOC as presented under BAE calculation above (applicant used 4.78 lb VOC/MBF for both BAE and PAE in latest application submittal). Form B for each kiln indicates expected operating schedule of 24 hours/day; 7

[112] Ibid 29
[113] Ibid 2

days/week; 52 weeks/year; 8,760 hours per year. Thus, the project VOC emissions expected from the kilns are greater than significance as shown below and PSD is triggered for VOC:

$$\Delta\,(\text{PAE} - \text{BAE}) \;=\; \Delta\,(634.33 \;-\; 244.38)\;\frac{tons}{yr}\;VOC \;= 389.95\;tpy\;VOC > 40\;tpy\;VOC$$

The proposed increase in VOC from this project for all 3 kilns exceeds the PSD significance level of 40 tpy VOC; hence, PSD is triggered.

- Boilers: Existing (ID Nos. B1 and Boiler2) and proposed wood-fired boiler (ID No. ES-Boiler3), each controlled by two multicyclones and an ESP

Wood-fired boiler (ID No. ES-Boiler3) potential criteria pollutant emissions before and after controls as provided by the applicant (Table 5-1 from application), in addition to calculated emissions are presented in detail under Section V.B.2. above. The new wood-fired boiler will provide steam to the kilns and allow for the requested increase in annual kiln throughput presented above. The existing wood-fired boiler emissions will be calculated at potentials (refer to Table 5-2: from application) and adjusted for the addition of an ESP (April 2019). For future projected actuals the emissions table provided in the latest application submittal used the requested 669,731 million Btu/yr limit for all three wood-fired boilers dispersed between proposed Boiler 3 and existing Boiler 2, leaving Boiler 1 at zero in Table C-5.1: Annual Emissions from Wood-Fired Boilers - Criteria Pollutants and Hazardous Air Pollutants. This is not an accurate reflection of the projected emissions or post project operation since the facility intends on utilizing B1. Thus, emissions presented throughout the PAE section will be based on all boilers PTE. The facility requested limits as discussed above to avoid triggering PSD for pollutants other than VOC, which will be included in a PSD Avoidance condition (See Section V.C.14. below) being added during permitting of this project with specific restrictions and limitations to ensure emissions from pollutants other than VOC do not exceed the PSD SER.

- Tanks:

Emissions from the No. 2 fuel oil tanks (ID Nos. IES-AST1 through IES-AST4) listed in the application as insignificant activities per 15A NCAC 02Q .0530(8) and discussed under Section V.B. above were calculated by the applicant using the US EPA's TANKS Emissions Estimation Software (Version 4.09). This software is now outdated and no longer supported by the EPA. The EPA website references the use of equations and algorithms specified in AP-42, Chapter 7 for estimating emissions from storage tanks.[114]

Due to the tanks program not being available, the tanks being insignificant sources and PSD triggered for VOC; the worse-case VOC emissions as presented in the original application and the June 14, 2019 application submittal will be included in the PAE VOC emissions summary table below. The emissions presented in the revised application received on April 1, 2020 are much lower and the footnote at the bottom of Table C-12: Tank Emissions indicates "assumes Boiler 4 Fuel Oil stored one 3,000 gallon and one 2,500 gallon tanks." In addition, "Future

[114] US EPA Clearinghouse for Inventories & Emission Factors – Software and Tools (https://www3.epa.gov/ttnchie1/software/tanks/); AP-42 Chapter 7: Liquid Storage Tanks

Projected" uses the 10 percent annual capacity factor. The permit contains both operating scenarios for Boiler 4; thus, emissions should be based on emission units PTE. Thus, VOC emissions expected from the four tanks presented below are from previous applications:

Table B-12
Tank Emissions

Emission Sources	Number of Tanks	Fuel Type	VOC Emissions (lb/hr)	VOC Emissions (lb/yr)	VOC Emissions (TPY)
3,000 gal Diesel Tanks	2	No. 2 Fuel Oil	0.001	11.260	0.006
2,500 gal Diesel Tanks	2	No. 2 Fuel Oil	0.002	16.760	0.008

Methodology
Tanks Program

Future projected VOC emissions are summarized below for PAE:

Emission Source ID Nos.	**Emission Factor**		**Emission Rate (tpy)**
			PAE
ES-B1	0.017	lb/ million Btu[115]	3.31
ES-Boiler2			2.14
ES-Boiler3			4.24
ES-Boiler4	0.252	lb/10^3 gallon[116]	0.257
ES-KILN-1, ES-KILN-2, ES-KILN-3	4.78	lb/MBF[117]	634.33
IES-AST1 and IES-AST2	Table B-12 for all 4 tanks[118]		0.006
IES-AST3 and IES-AST4			0.008
Total projected VOC emissions (tpy)			**644.30**
Total projected VOC emissions (tpy) less Boiler 4[119]			**644.04**

Example calculation for No. 2 fuel oil-fired boiler (ID No. ES-Boiler4):

$$\frac{0.252\ lb}{1{,}000\ gallon} * \frac{gallon}{140{,}000\ Btu} * \frac{1{,}000{,}000\ Btu}{million\ Btu} * 32.66\ \frac{million\ Btu}{hr} * 8{,}760\ \frac{hrs}{yr} * \frac{ton}{2{,}000\ lb}$$

$$= 0.257\ tpy\ VOC$$

[115] Ibid 44 - Table C-5.1 of the application also uses 0.017 lb/million Btu.
[116] US EPA AP-42, Chapter 1: External Combustion Sources, Table 1.3-3. EMISSION FACTORS FOR TOTAL ORGANIC COMPOUNDS (TOC), METHANE, AND NONMETHANE TOC (NMTOC) FROM UNCONTROLLED FUEL OIL COMBUSTION
[117] Ibid 29
[118] US EPA TANKS Emissions Estimation Software (Version 4.09)
[119] Ibid 108

NOx[120] emissions, expected from the boilers only, are summarized below for PAE:

ID Nos.	Emission Factor		Emission Rate (tpy)
			PAE
ES-B1	0.22	lb/million Btu[121]	42.88
ES-Boiler2			27.64
ES-Boiler3			54.92
ES-Boiler4	20	lb/10^3 gallon[122]	20.44
Total projected NOx emissions (tpy)			**145.87**
Total projected NOx emissions (tpy) less Boiler 4[123]			**125.45**

CO[124] emissions, expected from the boilers only, are summarized below for PAE:

The CO EFs for boilers (ID Nos. B1, Boiler2 and Boiler3) were taken from 2014 stack test conducted on May 22, 2014 and July 16, 2014 on boilers (ID Nos. B1 and Boiler2, respectively).[125] The worse-case CO EF (Refer to Section V.B. above for more details) from these tests was used for the proposed wood-fired boiler (ID No. Boiler3) per approval by SSCB memorandum dated March 19, 2020.[126]

ID Nos.	Emission Factor		Emission Rate (tpy)
			PAE
ES-B1	0.17	lb/million Btu	33.13
ES-Boiler2	0.24		30.16
ES-Boiler3	0.24		59.92
ES-Boiler4	5	lb/10^3 gallon[127]	5.11
Total projected CO emissions (tpy)			**128.32**
Total projected CO emissions (tpy) less Boiler 4[128]			**123.21**

SO_2[129] emissions, expected from the boilers only, are summarized below for PAE:

Refer to Section V.B.2.a. for example SO_2 EF (0.213 lb/1,000 gallon) calculation and emissions for No. fuel oil fired boiler (ID No. ES-Boiler4).

[120] Ibid 83
[121] Ibid 41
[122] US EPA AP-42, Chapter 1: External Combustion Sources, Table 1.3-1. CRITERIA POLLUTANT EMISSION FACTORS FOR FUEL OIL COMBUSTION
[123] Ibid 108
[124] Ibid 86
[125] Ibid 37 and 38
[126] Ibid 39
[127] Ibid 122
[128] Ibid 108
[129] Ibid 88

ID Nos.	Emission Factor		Emission Rate (tpy)
			PAE
ES-B1	0.025	lb/million Btu[130]	4.87
ES-Boiler2			3.14
ES-Boiler3			6.24
ES-Boiler4	142S or 0.213	lb/10^3 gallon[131]	0.22
Total projected SO2 emissions (tpy)			**9.82**
Total projected SO2 emissions (tpy) less Boiler 4[132]			**9.60**

Pb emissions, expected from the boilers only, are summarized below for PAE:

ID Nos.	Emission Factor		Emission Rate (tpy)
			PAE
ES-B1	$4.8x10^{-5}$	lb/million Btu[133]	0.0094
ES-Boiler2			0.0060
ES-Boiler3			0.0120
ES-Boiler4	9	lb/10^{12} Btu[134]	0.0013
Total projected Pb emissions (tpy)			**0.0286**
Total projected Pb emissions (tpy) less Boiler 4[135]			**0.0274**

CO_{2eq}[136] emissions, expected from the boilers only, are summarized below for PAE:

Emission Source ID No.	CO2		CH4		N2O		CO2 eqv
	EF (lb/million Btu)	tpy	EF (lb/million Btu)	tpy	EF (lb/million Btu)	tpy	tpy
ES-B1	206.79	40,305.44	0.016	3.12	0.0079	1.54	40,842.26
ES-Boiler2	206.79	25,985.68	0.016	2.01	0.0079	0.99	26,331.78
ES-Boiler3	206.79	51,627.19	0.016	3.99	0.0079	1.97	52,314.80
ES-Boiler4	163.05	23,324.96	0.0066	0.946	0.0013	0.189	23,405.00
Total projected CO_2 equivalent emissions (tpy)							**142,894.69**
Total projected CO_2 equivalent emissions (tpy) less Boiler 4[137]							**119,489.69**

PM, PM_{10} and $PM_{2.5}$ emissions, expected from the kilns, boilers, planer mill, wood fuel silos and other PM affected sources will be calculated using the same methodology used to determine

[130] Ibid 41
[131] Ibid 122
[132] Ibid 108
[133] Ibid 45
[134] US EPA AP-42, Section 1.3, Fuel Oil Combustion; Table 1.3-10. EMISSION FACTORS FOR TRACE ELEMENTS FROM DISTILLATE FUEL OIL COMBUSTION SOURCES
[135] Ibid 108
[136] Ibid 28
[137] Ibid 108

BAE (refer to Section V.C.8.b. above), except new sources will be calculated at PTE[138] and projected annual throughputs, unless noted. If a different methodology is used a detailed explanation will be provided (refer to Section V.B. above). Expected PM emissions are summarized below for PAE:

- Kilns:

An approved PM EF of 0.02231 lb PM/MBF[139] based on NCASI and DAQ Wood Kilns Emission Calculator was used for BAE capped at 119,500 MBF/yr:

$$265{,}411\ \frac{MBF}{yr} * 0.02231\ \frac{lb\ PM}{MBF} * \frac{ton}{2{,}000\ lb} = \ 2.96\ \frac{tons}{yr}\ PM$$

PM_{10} and $PM_{2.5}$ were calculated using EFs as presented in BAE calculation.[140]

Emission Source ID Nos.	PM (tpy)	PM10 (tpy)	PM2.5 (tpy)
ES-KILN-1, ES-KILN-2 and ES-KILN-3	2.96	1.72	0.664

- Boilers:

PM emissions from the boilers are calculated based on PTE of each boiler, as opposed to fuel usage as used in the BAE calculation (fuel usage calculations will be presented in the PSD Avoidance condition in Section V.C.14. below based on the requested maximum combined heat input to all boilers of 669,731 million Btu/yr). The PM EFs for the wood-fired boilers (ID Nos. ES-B1 and ES-Boiler2) will be based on the same EFs as used in the baseline evaluation and the approved EF for boiler 3 (ID No. ES-Boiler3) based on results from testing conducted on May 22, 2014 and July 16, 2014[141] versus AP-42 EF. The control scenario for all three wood-fired boilers are two multicyclones followed by an ESP. Per the application, Table C-5.1 PM=PM_{10}. PM for wood-fired Boiler 1 (ID No. ES-B1) is calculated as follows:

$$0.107\ \frac{lb\ PM}{million\ Btu} * 44.5\ \frac{million\ Btu}{hr}\ * \frac{ton}{2{,}000\ lb} * 8760\frac{hr}{yr} = 20.86\ \ tpy\ PM * \left(\frac{100-90}{100}\right)$$

$$= 2.086\ tpy\ PM$$

As discussed in Section V.B.2.b. above, the $PM_{2.5}$ EF of 0.137 lb/million Btu[142] will be used applying a CE of 90%[143] for an ESP, as calculated below for wood-fired Boiler 1 (ID No. ES-B1):

[138] Ibid 109
[139] Ibid 30
[140] Ibid 93
[141] Ibid 37, 38 and 39
[142] Ibid 48
[143] Ibid 50 and 51

$$0.137\ \frac{lb\ PM2.5}{million\ Btu} * 44.5\ \frac{million\ Btu}{hr}\ *\ \frac{ton}{2{,}000\ lb} * 8760\frac{hr}{yr} = 26.70\ \ tpy\ PM2.5 * \left(\frac{100-90}{100}\right)$$

$$= 2.67\ tpy\ PM2.5$$

Example calculation for Total PM[144] from the No. 2 fuel oil-fired boiler (ID No. ES-Boiler4):

$$\frac{(2+1.3)lb\ PM}{1{,}000\ gallon} * \frac{gallon}{140{,}000\ Btu} * \frac{1{,}000{,}000\ Btu}{million\ Btu} *\ 32.66\ \frac{million\ Btu}{hr} * 8{,}760\frac{hrs}{yr}$$

$$* \frac{ton}{2{,}000\ lb} = 3.37\ tpy\ Total\ PM$$

- Planer Mill:

$PM/PM_{10}/PM_{2.5}$ emissions calculated using methodology discussed under Section V.B.4. and used for BAE. As provided in Table C-7: Emissions from Planer Mill of the latest application submittal received by the Division on April 1, 2020 the future projected throughput and emissions are revised per methodology used in BAE and summarized below:

Planer Throughput	**Future projected**			
	265,411	**MBF/yr**	~~48,821.83~~ 53,082.2 @ 20%	**Tons**

$$1.20\ \frac{lb\ PM}{ODT} * (265{,}411 * 0.2)\ \frac{tons\ woodwaste}{yr} * \frac{ton}{2{,}000\ lb} = 31.849\ tpy\ PM$$

Pollutant	**NCASI EF [145] (lb/ODT)**	**PM (tpy)**	**PM10 (tpy)**	**PM2.5 (tpy)**
Total PM	1.20	31.85	8.49	1.70
PM10	0.32			
PM2.5	0.064			

Planer mill emissions summarized above are based on a shavings production rate of 20% without an adjust for moisture content of 15% as presented in Table C-7 (Refer to Section V.B above).

- Trim Saw and Wood Hog:

PM/PM_{10} emissions as presented in Table C-8 were verified. The facility used DAQ and NCASI methodology. The control device efficiencies provided with the first application submittals were erroneous. This revised application submittal received by the Division on April 1, 2020 uses DAQ approved cyclone CEs[146] of 85% for PM and 40% for PM_{10}.

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[144] US EPA AP-42, Section 1.3, Fuel Oil Combustion; Table 1.3-1. CRITERIA POLLUTANT EMISSION FACTORS FOR FUEL OIL COMBUSTION (Filterable PM) and Table 1.3-2. CONDENSABLE PARTICULATE MATTER EMISSION FACTORS FOR OIL COMBUSTION

[145] Ibid 58

[146] Ibid 55

$$265{,}410{,}662.2\ \frac{BF}{yr} * 0.00174\ \frac{lb\ PM\ generated}{BF} * \frac{ton}{2{,}000\ lb} * \left(1 - \frac{85}{100}\right) = 34.64\ tpy\ PM$$

- Wood fuel silos (ID Nos. ES-WCS and ES-WCS-2) controlled by cyclones (ID Nos. CD-C2 and CD-C5, respectively)

Table C-9 Wood Fuel Silo Emissions, the sawdust produced numbers per Table C-9 (confirmed with Table C-1) are only provided for baseline and future potential for Wood Fuel Silo Emissions. No distinction is made between existing wood fuel silo (ID No. WCS) and proposed (ID No. WCS-2). In addition, the lb/hr values used in Table C-9 basis is not provided. There is a footnote: Note: Hourly Emissions calculated in Future Potential Emissions Calculations (Table B-9). These emission rates differ from the emission rates for WCS-2 as calculated per Form B and C for the proposed WCS-2 and presented in Section V.B.3. above. The future actual emissions as provided in Table C-9 were used with $PM_{2.5}$ emissions corrected due to the applicant using 40% CE versus 10%. An emissions comparison table is provided below:

Pollutant	WCS-2 (revised calculations as presented in V.B.3. above)		WSC	WSC and WSC-2 per Table C-9		WSC increase
	Expected Actuals After Control (lb/hr)	PTE after controls (tpy)	BAE Average (tpy)	Future actual (lb/hr)	Future actual (tpy)	(tpy)
PM	0.95	4.16	4.53	2.93	9.96	1.27
PM_{10}	1.37	5.99	6.525	4.22	14.35	1.84
$PM_{2.5}$	0.63	2.75	2.99	1.29	6.58 ~~4.38~~	0.84

Per Table C-9: Wood Fuel Silo Emissions will be calculated by the following equation:

- Silo Annual Throughput (ton/yr) x Emission Factor (lb/ton) x (1-%CE)[147]

Per Tables C-1 & C-9 the future projected permitted throughput of sawdust is 132,827 tpy (Appendix B – Past Actuals vs Future Potential Emission Calculations; Table B-9 Future Potential is 170,977 tpy):

$$132{,}827\ \frac{tons\ sawdust}{year} * 1\ \frac{lb\ PM}{ton\ sawdust} * \frac{ton\ PM}{2{,}000\ lb} * (1 - 0.85) = 9.96\ tpy\ PM$$

Per Tables C-1 & C-9 the baseline actual throughput for 2016 – 2017 average is 60,405 tpy sawdust as presented under BAE above; thus, subtract baseline throughput from future projected permitted throughput from Table C-9 and PM emissions expected from this project are calculated using applicants equation based on silo throughput below:

$$132{,}827\ tpy\ future\ projected\ -\ 60{,}405\ tpy\ average\ BAE\ =\ 72{,}422\ tpy\ sawdust$$

[147] Ibid 55 and 56

$$72{,}422\ \frac{tons\ sawdust}{year} * 1 \frac{lb\ PM}{ton\ sawdust} * \frac{ton\ PM}{2{,}000\ lb} * (1 - 0.85) = \ 5.43\ tpy\ PM$$

The existing wood fuel silo (ID No. ES-WCS) emissions increase and proposed wood fuel silo (ID No. ES-WCS-2) emissions from summary table above, as a check, are estimated to be:

$$PM\ increase\ from\ project = 4.16\ tpy\ WCS - 2 + 1.27\ tpy\ WSC\ increase = 5.43\ tpy$$

The revised permit will contain a restriction for future projected permitted silo throughput of no more than 132,827 tpy sawdust, as presented in Troy's current application (refer to PSD Avoidance condition in Section V.C.14 below).

- Dry Wood Shavings Truck Loading:

PM emissions from these sources are summarized below from Table C-10 of the application submittal. The same methodology was used as with BAE, only increased amounts of wood waste transferred based on projected actuals:

Emissions Source	Amount Transfer (Tons)	Calculated Emission Factors (lb/ton transfer)			Emissions TPY		
		PM	PM10	PM2.5	PM	PM10	PM2.5
Chip Truck Loading	328,500.6	0.00134	0.00063	0.00010	0.220	0.104	0.016
Bark and Sawdust Truck Loading (Including Bark Trim)	184,362.8	0.00134	0.00063	0.00010	0.123	0.058	0.009
Bark and Sawdust Transfer	184,362.8	0.00134	0.00063	0.00010	0.123	0.058	0.009
Shavings Transfer	48,821.8	0.00134	0.00063	0.00010	0.033	0.015	0.002
Chips Transfer	328,500.6	0.00134	0.00063	0.00010	0.220	0.104	0.016
PM/PM10/PM2.5 Total Emissions for PAE (tpy)					0.719	0.340	0.052

- Paved and Unpaved Traffic Emissions:

PM emissions from these sources are summarized below from Table C-11 of the application submittal. The same methodology was used as with BAE, adjusting for the increase in VMT or traffic proportional to production increases:

Pollutant	Paved Roads (tpy)	Unpaved Roads (tpy)	Fugitive (tpy)
PM	1.81	1.54	**3.36**
PM10	0.36	0.39	**0.75**
PM2.5	0.03	0.39	**0.42**

PM, PM_{10} and $PM_{2.5}$ emission totals are summarized in the following table for PAE:

Emission Source ID No(s).	PM (tpy)	PM10 (tpy)	PM2.5 (tpy)
ES-B1	2.086	2.086	2.670
ES-Boiler2	2.727	2.727	1.722
ES-Boiler3	5.418	5.418	3.420
ES-Boiler4	3.372	1.104	0.848
ES-KILN-1, ES-KILN-2 and ES-KILN-3	2.961	1.725	0.664
ES-PM	31.849	8.493	1.699
ES-SH	34.636	3.894	0.000
ES-WCS and ES-WCS-2	9.962	14.345	6.575
Wood waste (sawdust)	0.719	0.340	0.052
Fugitive	3.360	0.750	0.420
Total projected PM/PM10/PM2.5 emissions (tpy)	**97.089**	**40.881**	**18.069**
Total projected PM/PM10/PM2.5 emissions (tpy) less Boiler 4[148]	**93.717**	**39.777**	**17.221**

c. Total Project Emission – BAE, PAE, Delta

The table below summarizes the emissions calculated during baseline years (2016 – 2017) "Baseline Actual Emissions" (BAE) as presented under Section V.C.8.a. above; the "Project Actual Emissions" (PAE) as presented under Section V.C.8.b. above, which includes the potential emissions for the wood-fired boiler (ID No. ES-Boiler3) and associated wood fuel silo (ID No. ES-WCS-2); and potentials for two existing wood-fired boilers; planer mill and waste collection system, and other PM affected sources; and the "Total Project Emission Increases" based on (PAE-BAE) compared to the PSD SER:

Total Project Emissions Summary – BAE, PAE and delta									
Pollutants	**VOC**	**PM**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**CO**	**SO_2**	**Pb**	**CO_{2e}**
BAE	247.38	63.998	40.604	28.407	38.86	35.5	4.12	0.00848	36,529.83
PAE	644.04	93.717	39.777	17.221	125.45	123.21	9.6	0.0274	119,489.69
(PAE-BAE)	**396.66**	**29.719**	**-0.827**	**-11.186**	**86.59**	**87.71**	**5.48**	**0.01892**	**82,959.86**
PSD SER	40	25	15	10	40	100	40	0.6	75,000
Major PSD Review Required	YES	YES	NO	NO	YES	NO	NO	NO	YES

The net emissions increases are less than the significant emissions rate of each regulated NSR pollutant, except VOC, PM, NOx and CO_2 equivalent emissions. Table 5-2 of the latest application submittal indicates the same pollutants exceed SER; however, the future potential emissions and BAE were revised (i.e., corrected erroneous CE, use of acceptable guidance and methodology) as part of this review and presented in the above summary table. Because the facility is PSD major, each pollutant with an increase greater than the "significance" level due to the proposed project is subject to PSD regulations and must meet certain review requirements.

[148] Ibid 108

However, the application came in with the purpose of not triggering PSD for any pollutants, other than VOC for this project.

Per the latest application submittal, since the past actual versus future potential emissions for the proposed project as presented in Appendix B exceeded the SERs for several pollutants above, Troy Lumber is requesting the following limitations to reduce the future emissions; therefore, avoid PSD, for all of the pollutants, except VOC:

- ❖ Maximum combined lumber throughput to Kilns 1, 2, and 3 of 265.41 MMBF/yr.
- ❖ Maximum combined heat input to all Boilers of 669,731 million Btu/yr.

Troy Lumber repeated the facility-wide PSD analysis on a past actual versus future projected basis using the permit limitations requested above as presented in Table 1 of Section III above. However, the methodology used for future projected emissions was erroneous (e.g., existing Boiler 1 was allotted zero fuel; hence, zero emissions).

DAQ has requested additional information from the applicant on several occasions due to the application deficiencies and erroneous data used in compiling the applications (e.g., control efficiencies (CE), emission factors (EF), vendor data (never provided), application not accurately reflecting current or projected future operations or emissions, lack of supporting documentation, incorrect methodology, etc.). Despite the numerous attempts to obtain the information necessary to draft a permit and review for this proposed project, the Division has deemed the application incomplete. However, the Division is drafting the permit with explicit restrictions and limitations based on the industry data available and reviews of other PSD applications for similar facilities.

To draft a permit which satisfies EPA's practical enforceability requirements and that only triggers PSD for VOC, the revised permit will include a PSD Avoidance condition (refer to Section V.C.14. below) based on the above requested limits, as well as additional restrictions on fuel heating values, EF, CE and methodologies used in calculating BAE and PAE presented above to ensure the facility stays below the SER for each pollutant that is affected by this project.

VOC emissions related to the proposed kiln project results in both a significant emission increase and a significant "net" emissions increase for the facility and thus, the project is subject to NSR/PSD review. As an existing major source, the facility must implement best achievable control technology (BACT) and assess the environment impacts for each pollutant associated with the proposed project with a significant emissions increase.

As part of this review process, Troy Lumber must demonstrate the following:

- The best available control technology (BACT) on a case-by-case basis in accordance with 40 CFR 51.166(j), has been selected for the VOC emissions resulting from the proposed project;
- The VOC emissions from the project's construction and operation will not cause, or contribute to, air pollution more than any national ambient air quality standard (NAAQS) in any air quality control region, or any other applicable emission standard or standard of performance (i.e., Air Quality Analysis including Class I and Class II areas). VOC impacts

are determined through regional scale modeling and regulated under North Carolina's State Implementation Plan (SIP); and

- The project's construction and operation will not cause or contribute to any other significant adverse impact including effects on soils and vegetation and impacts on visibility in accordance with 40 CFR 51.166(o).

These analyses and reviews required for NSR/PSD are discussed in Section VI below.

9. 15A NCAC 02D .0540 – Particulates from Fugitive Dust Emission Sources

The Permittee shall not cause or allow fugitive dust emissions to cause or contribute to substantive complaints or excess visible emissions beyond the property boundary. If substantive complaints or excessive fugitive dust emissions from the facility are observed beyond the property boundaries for six minutes in any one hour (using Reference Method 22 in 40 CFR, Appendix A), the owner or operator may be required to submit a fugitive dust plan as described in 02D .0540(f).

"Fugitive dust emissions" means particulate matter from process operations that does not pass through a process stack or vent and that is generated within plant property boundaries from activities such as: unloading and loading areas, process areas, stockpiles, stock pile working, plant parking lots, and plant roads (including access roads and haul roads).

This proposed modification will increase production; thus, proportionally increase fugitive PM emissions from the following unmodified but affected sources: transfer to waste collection systems, truck loading, heavy equipment used to move bark, chips, sawdust, etc. and roads (refer to discussion under 02D .0530 above and 02Q .0317 for PSD Avoidance below).

This regulatory condition is found in Section 3 – General Conditions, MM. Fugitive Dust Control Requirement of the permit.

10. 15A NCAC 2D .0614 – Compliance Assurance Monitoring (CAM) Rule

The compliance assurance monitoring (CAM) rule requires owners and operators to conduct monitoring to provide a reasonable assurance of compliance with applicable requirements under the Clean Air Act. The CAM Rule (40 CFR Part 64) applies to pollutant-specific emissions units (PSEU) that are pre-control major sources and use a control device to comply with an emissions limit. Monitoring focuses on emissions units that rely on pollution control device equipment to achieve compliance with applicable standards. The following four criteria must be met for an emissions unit to be subject to the CAM Rule, under 40 CFR Part 64 and 15A NCAC 02D .0614:

a. The emission unit must be located at a major source for which a Part 70 or Part 71 permit is required.
b. The emission unit must be subject to any (non-exempt, e.g., pre-November 15, 1990, Section 111 or 112 standard) emission limitation or standard for the applicable regulated pollutant.
c. The emission unit must use a control device to achieve compliance with the emission limitation or standard.

d. The emission unit must have potential, pre-controlled emissions of the pollutant of at least 100 percent of the major source threshold; i.e., either 100 tpy (for criteria pollutants) or 10 tpy of any individual/25 tpy of any combination of HAP.

Control device means equipment, **other than inherent process equipment**, that is used to destroy or remove air pollutant(s) prior to discharge to the atmosphere. The types of equipment that may commonly be used as control devices include, but are not limited to, fabric filters, mechanical collectors, electrostatic precipitators, etc.

An analysis for CAM is required for large pollutant-specific emissions units (PSEUs) as part of an application for a significant permit revision for those PSEUs for which the permit revision is applicable [40 CFR 64.5(a)(2)]. A PSEU is considered large if it has a post-control potential to emit of a regulated pollutant greater than 100 percent of the amount for a source to be classified as a major source [40 CFR 64.5(a)].

- Existing wood-fired Boilers 1 and 2 are currently equipped with multicyclones and ESPs (permitted April 30, 2020) in series with the multicyclones. These control devices are being used to comply with 02D .0504 (total PM) and Subpart DDDDD (filterable PM). According to the manufacturer's information provided in the permit application (No. 6200029.18A), the post-control filterable particulate emissions from Boiler 1 will be less than 5 tpy and Boiler 2 will be less than 4 tpy. The major source threshold for PM is 100 tpy. Therefore, Boilers 1 and 2 are not considered large PSEUs and a CAM evaluation is not necessary until the next permit renewal.
- Proposed wood-fired Boiler 3 will use the same control scenario as existing boilers 1 and 2 to achieve compliance with applicable emission limitations. In addition, upon startup this boiler will be subject to MACT Subpart DDDDD. The non-exempt pre-controlled emissions do not exceed 100% of the major source threshold (The major source threshold for PM is 100 tpy). Therefore, Boiler 3 is not considered a large PSEU and a CAM evaluation is not necessary until the next permit renewal.
- No. 2 fuel oil-fired Boiler 4 does not use a control device to achieve compliance with an emission limitation and is subject to MACT Subpart DDDDD; therefore, CAM does not apply to this source.

As discussed above, the combustion sources (i.e., boilers) that are controlled do not have potential, pre-controlled emissions of a pollutant of at least 100 percent of the major source threshold. In addition, upon issuance of this permit the existing boilers will all be subject to MACT Subpart DDDDD; thus, they are exempt from CAM requirements at this time.

- The Kilns #1, #2 and #3 do not have any control devices and are subject to MACT Subpart DDDD; thus, they are exempt from CAM requirements.

- PM Sources: Although PM emissions are expected to increase due to the proposed increase in annual lumber production throughput and boiler utilization; the PM sources are not being modified as part of this PSD project. These PM sources use control devices to comply with applicable regulations and will be evaluated for CAM during processing of the renewal

application due on July 31, 2020, within six months of Troy's current permit (02330T24) expiring (January 31, 2021).

11. 15A NCAC 02D .1100 – Control of Toxic Air Pollutants and 15A NCAC 02Q .0700 – Control of Toxic Air Pollutants

Troy Lumber's current air permit (02330T24) does not contain any toxic air pollutants (TAP) emission limits. During the processing of Application No. 6200029.15B (issuance of Permit No. 02330T19) the state air toxics regulations 02D .1100 (modeled) and 02Q .0711 (TPERs) were removed from the permit per Troy Lumber's request pursuant to 02Q .0702(a)(27) since the affected emission sources were subject to the 112(j) Case-by-Case MACT for the Boiler MACT Subpart DDDDD and the Plywood Composite Wood Products MACT Subpart DDDD for the kilns. In addition, based on the review for permit 02330T19, a qualitative analysis was submitted July 17, 2015 to show there would not be an adverse impact on human health due to the proposed changes (i.e., production increase in wood drying to 175.2 million BF/year and modification to the Kilns 1 and 3 to include stacks and forced air exhaust to improve dispersion). During the review and analysis for this permit modification, it was noted that there will not be an increase in the hourly emissions rate of any TAP. The yearly amount of emissions associated with wood fuel combustion normally associated with a production increase are actually expected to decrease due to the energy savings resulting from conversion to hybrid kilns.[149] Since there did not appear to be an adverse impact on human health and in response to this request the boilers and kilns were granted the exemption; thus, 02D .1100 and the associated requirements were removed from the permit.

Prior to issuance of 02330T19 for a significant modification, Troy's permit contained emission limits for several TAPs based on previous facility-wide modeling analyses. The results of previous modeling conducted at Troy Lumber are discussed in more detail below.

a. Troy submitted an application (6200029.10A) for a state only modification of their Title V permit on March 30, 2010 in response to the "Director's Call – Toxics Compliance Demonstration for Combustion Sources" letter dated September 24, 2009. The Director's Call application was requested after NC DAQ modeled impacts of TAP emissions from combustion sources at facilities throughout the state. The Director's call applied to all facilities for which modeling show that TAP emissions from the combustion sources have the potential to exceed one or more AALs listed in 02D .1104. NC DAQ modeling performed by AQAB indicated that 10 pollutants exceeded their respective TPERs. Please refer to modeling memorandum dated August 24, 2009 from Mr. Anderson, AQAB, to Mr. William Willets, RCO indicating, with the exception of arsenic, the modeling adequately demonstrates compliance, on a source-by-source basis, with the AALs for each toxic modeled. The table from this memorandum is included below:

Pollutant	Averaging Period	% of AAL
Acrolein	1-hour	55 %
Arsenic	annual	**245 %**
Benzene	annual	90 %

[149] Ibid 3

Pollutant	Averaging Period	% of AAL
Beryllium	annual	1 %
Cadmium	annual	2 %
Chlorine	24-hour	1 %
Formaldehyde	1-hour	79 %
Hexachlorodibenzo-p-dioxin	annual	54 %
Hydrogen chloride	1-hour	4 %
Manganese compounds	24-hour	2 %

As required by the Director's Call, if affected TAPs can also be emitted from other, non-combustion sources at the facility, these emissions must also be included in the modeling. As a result, the Permittee evaluated a total of 34 TAPs, known to be emitted from various combustion sources (boilers). These TAPs are acetaldehyde, acrolein, arsenic, benzene, benzo(a)pyrene, beryllium, cadmium, carbon tetrachloride, chlorine, chlorobenzene, chloroform, soluble chromate compounds, as chromium (VI) equivalent, di(2-ethylhexyl) phthalate, ethylene dichloride, formaldehyde, hexachlorodibenzo-p-dioxin, hydrogen chloride, manganese, mercury vapor, methyl chloroform, methyl ethyl ketone, methylene chloride, nickel metal, pentachlorophenol, perchloroethylene, phenol, polychlorinated biphenyls, styrene, tetrachlorodibenzo-p-dioxin, toluene, trichloroethylene, trichlorofluoromethane, vinyl chloride, and xylene. The Permittee indicated in Table 1 of the Director's Call application that acetaldehyde, acrolein, formaldehyde, and phenol were pollutants common to both the boilers and kilns.

Thus, the Permittee submitted an application and modeling analysis that included a summary of facility-wide TAPs at maximum actual emissions of each of the combustion and non-combustion sources for the above 34 listed compounds. Of the 34 listed compounds, nine TAPs exceeded the applicable TPERs, which were acrolein, arsenic, benzene, beryllium, cadmium, chlorine, formaldehyde, hydrogen chloride, and manganese.

b. Per the Director's Call the facility was required to submit a permit application and air dispersion modeling analysis consistent with the provisions in 02D .1106. No modeling memorandum is available; however, per the review for issued permit No. 02330T16 the facility submitted an application and modeling analysis to modify their permit as a result of the Director's Call letter dated September 24, 2009. The model report submitted by the facility demonstrated that total facility emissions of arsenic can meet the AALs for TAPs by adding boiler stack extensions of 15 feet (ft) and application of an annual wood firing limitation of 46,000 tons per year (tpy).

The following operating restrictions were included in the permit to assure compliance with the emission rates provided in the application and subsequently placed in revised permit 02330T16:

- Total heat input on a facility wide basis not to exceed 414,000 million Btu per year (equivalent to 46,000 tons per year wood burning and 4,500 Btu per pound heat content)[150].

[150] Ibid 54

- Stack extensions for each boiler by 15 feet.
- The permittee was required to test the heat content of wood on an annual basis.

To comply with the emission rates as reviewed and approved by the AQAB on May 3, 2010 based on the above information, "the modeling analysis adequately demonstrates compliance with the AALs for all TAPs on a source-by-source basis." In addition, a memorandum dated June 3, 2010, AQAB concluded "with the addition of the revised modeling, compliance is adequately demonstrated with either boiler operating at maximum capacity, as long as the 46,000 tpy combined total fuel use limit is enforced."

The TAPs, which exceeded the TPERS in 02Q .0711, were then evaluated for compliance with the applicable acceptable ambient levels (AALs) in 02D .1104 as summarized below based on information submitted as supplemental information to the Director's Call modeling analysis on May 27, 2019:

❖ Model Results for TAPs common to Kilns and Boilers

Pollutant	Averaging Period	% of AAL
Acrolein	1-hour	45 %
Formaldehyde	1-hour	63 %

❖ Model Results for TAPs common to Boilers

Pollutant	Averaging Period	% of AAL
Arsenic[151]	annual	**96 %**
Benzene	annual	29 %
Beryllium	annual	0 %
Cadmium	annual	1 %
Chlorine	24-hour	0.3 %
Hydrogen chloride	1-hour	2 %
Manganese compounds	24-hour	0.63 %

In brief, the Permittee demonstrated compliance with the applicable AALs for the above nine pollutants with predicted concentrations ranging from less than 1 percent (beryllium, chlorine and manganese) to 96% (arsenic) of applicable AALs.

The revised permit (issued permit No. 02330T16) contained TAP emission rates based on the following:

- Pollutants having an averaging basis of 1 hour – maximum heat input rate of each boiler on an hourly basis and emissions factors included in DAQ spreadsheet, "Wood Waste Combustion," and maximum lumber charge rate of each kiln in board feet (bd-ft) and DAQ spreadsheet on "Various Woodworking Operations – Lumber Kilns."

[151] Arsenic AAL at time of the Director's Call was 0.23 mg/m^3 it has since been revised to 2.1 x 10^{-6} mg/m^3

- Pollutants having an averaging basis of 24-hour – maximum heat input rate of each boiler on an hourly basis, 24 hours of operation for each boiler, and emission factors included in DAQ spreadsheet on "Wood Waste Combustion."
- Pollutants having an averaging basis of annual – maximum heat input rate of each boiler on an hourly basis at 8,760 hours, and emission factors included in DAQ spreadsheet on "Wood Waste Combustion," and the facility wide wood burning rate not to exceed 46,000 tons/yr.

c. Troy submitted an application (6200029.08A) for significant modification of their Title V permit on April 4, 2008 for which Title V Air Permit No. 02330T15 was issued. The facility requested an increase in production capacity at the facility from 110,000 MMBF/yr to 137,500 MMBF/yr. A result of kiln loading improvements that allow the facility to increase the amount of wood dried per charge by 30,000 board feet. Each kiln will now be capable of drying 150,000 board feet per charge (bf/charge) instead of the previous 120,000 bf/charge. As a result of this production increase the facility became major for HAP's and the two wood drying kilns became subject to 40 CFR 63 Subpart DDDD initial notification requirements.

The facility was required to undergo modeling for formaldehyde and acrolein due to the increase in production capacity at the facility that resulted in emission levels higher than the TPER limit for both pollutants. Emissions of formaldehyde will now be limited to 0.420 pounds per hour (lbs/hr) and acrolein is now listed in the permit as having a limit of 0.150 lbs/hr. Both limits are a result of modeling that demonstrated compliance with the Acceptable Ambient Level (AAL) for each pollutant at the increased lumber production rate. Please refer to modeling memorandum dated April 15, 2008 from Mr. Tom Anderson, Air Quality Analysis Branch (AQAB), to Mr. Mike Gordon, Raleigh Central Office (RCO) indicating the modeling adequately demonstrates compliance, on a source-by-source basis, for both toxics. The table from this memorandum is included below:

Pollutant	Averaging Period	% of AAL
Acrolein	1-hour	30 %
Formaldehyde	1-hour	43 %

Because this PSD project does involve new sources of TAPs, an increase in annual lumber throughput and maximum heat input rates for the existing and proposed boilers; an increase in emissions of TAPs is expected. The Division is required to evaluate whether there is an unacceptable risk. However, the facility is not required to provide a modeling analysis because the affected sources are exempt pursuant to 15A NCAC 02Q .0702 EXEMPTIONS (a):
…
(18) combustion sources as defined in 15A NCAC 02Q .0703, except new or modified combustion sources permitted on or after July 10, 2010;
…
(27) an air emission source that is any of the following: (A) subject to an applicable requirement pursuant to 40 CFR Part 61, as amended; (B) an affected source pursuant to 40 CFR Part 63, as amended; or (C) subject to a case-by-case MACT permit requirement issued by the Division pursuant to Paragraph (j) of 42 U.S.C. Section 7412, as amended;…

During a PSD Application meeting with the facility on May 13, 2019 in response to an additional information request sent to Troy Lumber on April 24, 2019, the requirement for modeling to determine if the project increases in TAP emissions would present an unacceptable risk to human health per Session Law 2012-91, House Bill 952 was discussed. At that time, it was DAQ's understanding that the facility's consultant Mr. Deyo would perform the modeling evaluation and submit the analysis with the revised application to adjust baseline emissions to the facility's PSD avoidance limit and other items discussed during the meeting.

Upon review of the revised application submittal received on June 14, 2019, no modeling analysis was provided. During several correspondences (i.e., email and teleconferences) between DAQ staff and Mr. Deyo the need for a toxics evaluation and clarification as to whether Troy Lumber wanted the DAQ to perform the analysis to determine if the increase in TAP emissions would present an unacceptable risk to human health per Session Law 2012-91, House Bill 952 and pursuant to 15A NCAC 02Q .0706 "Modifications" and 02Q .0709 "Demonstrations" occurred. It was also discussed that in order for DAQ to perform the analysis, Troy Lumber needed to provide the correct emission rates and supporting documentation (i.e., assumptions, push rates, board feet charge, calculations, etc.), address all TAPs (e.g., phenol, arsenic, etc. not in the original submittals) and provide the location and parameters necessary for modeling of any new sources in the revised application or modeling request submittal.

Per the most recent application submittal received by the Division on April 1, 2020; Form D1 – Facility-wide Emissions Summary nine (9) TAPs were listed: acetaldehyde, acrolein, benzene, formaldehyde, phenol, styrene, hydrogen chloride, manganese and mercury. The applicant marked no modeling was required due to MACT sources.

Form D3 – Modeling Request Forms was provided via email on April 2, 2020 and included the 9 TAPs listed on Form D1 discussed above.

A review of the revised application submittal, Form D1 and Form D3 revealed issues with the TAPs data (e.g., some TAPs were omitted, emission rates provided could not be duplicated, or some of the TAP emission rates provided on Form D3 do not match what was provide in the application). Those issues were discussed with this review engineer's supervisor on April 24, 2020. At that time, Mr. Pullen advised that for now we evaluate the unacceptable risks based on a worse-case (i.e., 8,760 hrs/yr for the boilers and kilns at requested annual production) scenario and include any TAPs that were omitted.

The analysis to determine the appropriate TAP emission rates was performed using DAQ's boiler combustion spreadsheet[152] (34 TAPs), DAQ kiln spreadsheet[153] (4 TAPs) and available EF data to determine worse-case emissions expected from the proposed project. The determination was based on 8,760 hrs/yr for the 3 wood-fired boilers and the facility's requested combined annual kiln throughput of 265,410,662 board feet for all 3 kilns.

Based on DAQ's review of the expected emissions from affected sources located at Troy Lumber, a total of thirty-four (34) TAPs were evaluated. However, only fourteen (14) TAPs

[152] Ibid 80
[153] Ibid 30

were included in the evaluation emailed to Mr. Anderson, AQAB, for a modeling determination analysis and review on May 7, 2020. Twelve (12) TAPs exceeded their respective Toxic Permit Emission Rates (TPERs). Acetaldehyde (a TAP and HAP) emitted from both the kilns and boilers did not exceed its respective TPER; however, it is included in the comparison table below since it was included in the application. Hexachlorodibenzo-p-dioxin 1,2,3,6,7,8 (previously triggered modeling – see table above) and mercury (because it was included on Forms D1 and D3 of the application and modeling submittal) were two of the 34 TAPs evaluated (from the boilers only) and included in the list below; however, neither exceeded their respective TPER. The following 15 TAPs were evaluated and compared to their respective TPERs as presented in the table below:

Pollutant	**TPER**	**Facility-Wide Future Actuals based on DAQ Wood Combustion & Kiln Spreadsheets**	**Exceedance?**
Acetaldehyde	1-hour 6.8 lb/hr	2.136 lb/hr	No
Acrolein	1-hour 0.02 lb/hr	0.813 lb/hr	Yes
Arsenic	Annual 0.53 lb/yr	25.09 lb/yr	Yes
Benzene	Annual 8.1 lb/yr	4,789.95 lb/yr	Yes
Benzo(a)pyrene	Annual 2.2 lb/yr	2.96 lb/yr	Yes
Beryllium Metal	Annual 0.28 lb/yr	1.25 lb/yr	Yes
Cadmium Metal	Annual 0.37 lb/yr	4.68 lb/yr	Yes
Chlorine	24-hour 0.79 lb/day	2.47 lb/day	Yes
Formaldehyde	1-hour 0.04 lb/hr	1.29 lb/hr	Yes
Hexachlorodibenzo-p-dioxin 1,2,3,6,7,8	Annual 0.0051 lb/yr	0.0000363 lb/yr	No
Hydrogen chloride	1-hour 0.18 lb/hr	2.47 lb/hr	Yes
Manganese	24-hour 0.63 lb/day	4.999 lb/day	Yes
Mercury	24-hour 0.013 lb/day	0.011 lb/day	No
Phenol	1-hour 0.24 lb/hr	0.397 lb/hr	Yes
Styrene	1-hour 2.7 lb/hr	0.247 lb/hr	No

- **Model Results for TAPs emitted from Kilns and Boilers per this PSD Project**

No adjustment was made for the boilers per the facility's requested maximum combined heat input to all boilers of 669,731 million Btu per year for the initial modeling analysis. The initial modeling analysis evaluated the 12 TAPs listed above that exceeded their respective TPER. This preliminary analysis resulted in benzene exceeding the AAL. Therefore, the modeled emission rates were reevaluated based on the combined heat input to the three wood-fired boilers equivalent fuel restriction for the 3 wood-fired boilers of 74,415 tpy (as calculated below under the PSD Avoidance condition in Section V.C.14 below). To provide the AQAB with individual emission rates for each boiler based on the fuel restriction for the 3 wood-fired boilers combined; emission rates were ratioed by comparing each boilers individual emission rates (lb/yr) to the combined boiler emission rates at potential (8,760 hrs/yr) using DAQ's combustion calculator. The ratio percentage was applied to the 3 boilers combined emission rate (input to DAQ's emission calculator of 130.19 (44.5+28.69+57) million Btu/yr) applying the fuel restriction, as presented in the following table for benzene:

Boiler ID No.	lb/year @ 8,760 hrs/yr	Ratio %	lb/year @ 74,414.6 tpy fuel	lb/year applying ratio
ES-B1	1637.24	34.18		961.46
ES-Boiler2	1055.56	22.04		619.87
ES-Boiler2	2097.14	43.78		1231.54
3 wood-fired boilers combined	**4789.95**	100	**2812.87**	**2812.87**

The revised emission rates indicated compliance with the AAL for benzene; thus, the unacceptable risk to human health is eliminated. For consistency, revised emission rates using the above ratios were used in the revised modeling evaluation for the twelve TAPs listed in the table below.

A memorandum dated July 20, 2020 prepared by Mark Yoder, AQAB indicates the modeling adequately demonstrates compliance on a source-by-source basis for all pollutants modeled. Modelled emission rates were based on:

- an annual fuel restriction for 3 wood-fired boilers combined using 74,415 tpy "wet wood" restriction based on a heating value of wood fuel on a wet, as-fired basis of 4,500 Btu/lb (equivalent to a maximum annual heat content of 669,731.6 million Btu/yr), and
- an annual production limitation for all 3 kilns combined of 265.41 MMBF/yr.

Pollutant	Averaging Period	% of AAL
Acrolein*	1-hour	53.41%
Arsenic	Annual	19.05%
Benzene	Annual	63.84%
Benzo(a)pyrene	Annual	0.15%
Beryllium	Annual	0.49%

Pollutant	Averaging Period	% of AAL
Cadmium	Annual	1.27%
Chlorine	24-hour	0.69%
Formaldehyde*	1-hour	69.5%
Hydrogen chloride	1-hour	3.62%
Manganese	24-hour	1.68%
Phenol*	1-hour	6.0%
Styrene	1-hour	0.02%

*****TAPs in common with kilns and boilers

Based on the restrictions above (discussed under the PSD Avoidance condition in Section V.C.14 below), the effects on the environment as a result of this modification will be minimal. The emission sources located at Troy Lumber are exempt from toxics and DAQ performed an evaluation that indicates that there is no unacceptable risk to human health per Session Law 2012-91, House Bill 952 and pursuant to 15A NCAC 02Q .0706 "Modifications" and 02Q .0709 "Demonstrations."

12. 15A NCAC 02D .1111 – Maximum Achievable Control Technology, Subpart DDDD - National Emission Standards for Hazardous Air Pollutants for Plywood and Composite Wood Products

Primary emissions from southern yellow pine lumber kilns are VOCs (which are composed of HAP and non-HAP compounds) generated as a result of the drying process. Overall, VOC/HAP emissions increase with temperature and vary greatly by species. The following HAPs are typically expected from softwood lumber kilns: acetaldehyde, acrolein, formaldehyde, methanol, phenol and propionaldehyde.[154] Thus, lumber kilns are subject to Subpart DDDD.

§63.2230 What is the purpose of this subpart?
This subpart establishes national compliance options, operating requirements, and work practice requirements for hazardous air pollutants (HAP) emitted from plywood and composite wood products (PCWP) manufacturing facilities. This subpart also establishes requirements to demonstrate initial and continuous compliance with the compliance options, operating requirements, and work practice requirements.

§63.2231 Does this subpart apply to me?
This subpart applies to you if you meet the criteria in paragraphs (a) and (b) of this section.

(a) You own or operate a PCWP manufacturing facility. A PCWP manufacturing facility is a facility that manufactures plywood and/or composite wood products by bonding wood material (fibers, particles, strands, veneers, etc.) or agricultural fiber, generally with resin under heat and pressure, to form a structural panel or engineered wood product. Plywood and composite wood products manufacturing facilities also include facilities that manufacture dry veneer and lumber kilns located at any facility. Plywood and composite wood products include, but are not limited to, plywood, veneer, particleboard, oriented strandboard, hardboard, fiberboard, medium density

[154] Forest Products Journal, Emissions of Hazardous Air Pollutants from Lumber Drying, Volume 58, No. 7/8, July/August 2008.

fiberboard, laminated strand lumber, laminated veneer lumber, wood I-joists, kiln-dried lumber, and glue-laminated beams.
(b) The PCWP manufacturing facility is located at a major source of HAP emissions. A major source of HAP emissions is any stationary source or group of stationary sources within a contiguous area and under common control that emits or has the potential to emit any single HAP at a rate of 9.07 megagrams (10 tons) or more per year or any combination of HAP at a rate of 22.68 megagrams (25 tons) or more per year.
[69 FR 46011, July 30, 2004, as amended at 72 FR 61062, Oct. 29, 2007]

- Troy currently operates 2 steam-heated indirect-fired continuous kilns (ID Nos. ES-KILN-1 and ES-KILN-3) and proposes restart and conversion of batch kiln #2 (ID No. ES-KILN-2); thus, this MACT is applicable.

§63.2252 What are the requirements for process units that have no control or work practice requirements?

For process units not subject to the compliance options or work practice requirements specified in §63.2240 (including, but not limited to, lumber kilns), you are not required to comply with the compliance options, work practice requirements, performance testing, monitoring, and recordkeeping or reporting requirements of this subpart, or any other requirements in subpart A of this part, except for the initial notification requirements in §63.9(b).
[85 FR 49455, Aug. 13, 2020]

- Troy is only subject to the initial notification requirements as detailed below:

40 CFR § 63.9 – Notification requirements.

(b)*Initial notifications.* (1)(i) The requirements of this paragraph apply to the owner or operator of an affected source when such source becomes subject to a relevant standard.
(ii) If an area source …
(iii) Affected sources that are required under this paragraph to submit an initial notification may use the application for approval of construction or reconstruction under § 63.5(d) of this subpart, if relevant, to fulfill the initial notification requirements of this paragraph.
(2) The owner or operator of an affected source that has an initial startup before the effective date of a relevant standard under this part shall notify the Administrator in writing that the source is subject to the relevant standard. The notification, which shall be submitted not later than 120 calendar days after the effective date of the relevant standard (or within 120 calendar days after the source becomes subject to the relevant standard), shall provide the following information:
(i) The name and address of the owner or operator;
(ii) The address (i.e., physical location) of the affected source;
(iii) An identification of the relevant standard, or other requirement, that is the basis of the notification and the source's compliance date;
(iv) A brief description of the nature, size, design, and method of operation of the source and an identification of the types of emission points within the affected source subject to the relevant standard and types of hazardous air pollutants emitted; and
(v) A statement of whether the affected source is a major source or an area source.
(3) [Reserved]

(4) The owner or operator of a new or reconstructed major affected source for which an application for approval of construction or reconstruction is required under § 63.5(d) must provide the following information in writing to the Administrator:
(i) A notification of intention to construct a new major-emitting affected source, reconstruct a major-emitting affected source, or reconstruct a major source such that the source becomes a major-emitting affected source with the application for approval of construction or reconstruction as specified in § 63.5(d)(1)(i); and
(ii)-(iv) [Reserved]
(v) A notification of the actual date of startup of the source, delivered or postmarked within 15 calendar days after that date.
(5) The owner or operator of a new or reconstructed affected source for which an application for approval of construction or reconstruction is not required …

Troy requested that the application serve as the initial notification as allowed under 40 CFR § 63.9(b)(1)(iii); hence, the only requirement under this Subpart is notification of the actual date of startup of kiln #2 (ID No. ES-KILN-2) within 15 calendar days. This requirement will be added to the revised permit.

The residual risk and technology review (RTR) of the plywood and composite wood products NESHAP was published in the Federal Register on August 13, 2020.

The technology review of the PCWP standards did not identify any developments that would further reduce air toxics emissions for process units regulated under the original NESHAP. Thus, no change to the draft permit is necessary.

13. 15A NCAC 02D .1111 – Maximum Achievable Control Technology, Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

§63.7480 What is the purpose of this subpart?

This subpart establishes national emission limitations and work practice standards for hazardous air pollutants (HAP) emitted from industrial, commercial, and institutional boilers and process heaters located at major sources of HAP. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and work practice standards.

§63.7485 Am I subject to this subpart?

You are subject to this subpart if you own or operate an industrial, commercial, or institutional boiler or process heater as defined in §63.7575 that is located at, or is part of, a major source of HAP, except as specified in §63.7491. For purposes of this subpart, a major source of HAP is as defined in §63.2, except that for oil and natural gas production facilities, a major source of HAP is as defined in §63.7575.
[78 FR 7162, Jan. 31, 2013]

- Existing wood-fired Boilers 1 and 2 (ID Nos. ES-B1 and ES-Boiler2) are currently equipped with multicyclones and ESPs (permitted April 30, 2020) in series with the multicyclones. These control devices are being used to comply with 02D .0504 (total PM) and Subpart DDDDD (filterable PM). According to the manufacturer's information provided in the permit application (No. 6200029.18A), the post-control filterable particulate emissions from Boiler 1 will be less than 5 tpy and Boiler 2 will be less than 4 tpy.

- Section 2.3 – Permit Shield for Non-applicable Requirements of Troy Lumber's current permit contains a permit shield that was contingent on hybrid kilns.[155] The condition reads:

  Once the Kilns are operated as hybrid units, the boilers **(ID Nos. ES-B1 and ES-Boiler2)** become process heaters and the Boiler MACT (40 CFR Part 63, Subpart DDDDD) shall no longer apply for the following reasons:

  The Permittee is shielded from the following non-applicable requirements [15A NCAC 02Q .0512(a)(1)(B)]:

  A. 15A NCAC 02D .1111, Maximum Achievable Control Technology (40 CFR 63, Subpart DDDDD):

     1. On **January 31, 2013** the Boiler MACT was amended as follows:

        § 63.7491 Are any boilers or process heaters not subject to this subpart?

        (h) Any boiler or process heater that is part of the affected source subject to another subpart of this part, such as boilers and process heaters used as control devices to comply with subparts JJJ, OOO, PPP, and U of this part.
        Federal Register /Vol. 76, No. 54 /Monday, March 21, 2011 /Rules and Regulations

     2. The applicability determination from EPA's ADI Control Number: M070006 dated **09/27/2006**. This ADI was concerning the applicability of Part 63, DDDD and DDDDD to Integrated Heat Energy Systems at the Norbord Industries LLP Jefferson Oriented Strandboard.

As discussed under Section III.C.1. above, Troy Lumber decided not to pursue the conversion of Kiln 1 and 3 to hybrid operation (Application No. 6200029.15B) which exempted the two existing boilers (ID Nos. ES-B1 and ES-Boiler2) from the Boiler MACT. Thus, the Permit Shield for Non-applicable Requirements pertaining to existing kilns and boilers (ID Nos. ES-B1 and ES-Boiler2) will be removed during processing of this PSD project. Since the two existing kilns and boilers never operated in hybrid mode, the boilers are now subject to the Boiler MACT.

- Proposed Boiler 3 (ID No. ES-Boiler3) will use the same control scenario as existing boilers 1 and 2 to achieve compliance with applicable emission limitations. Upon startup this boiler will be subject to MACT Subpart DDDDD.

[155] Ibid 3

- Boiler 4 (ID No. ES-Boiler4) does not use a control device to achieve compliance with an emission limitation and is subject to MACT Subpart DDDDD.

This rule establishes emission limits and work practice standards for HAP emissions from the four boilers at this facility (ID Nos. ES-B1 through ES-Boiler4). The regulatory requirements will be incorporated into the modified permit per language provided by Mr. Joe Voelker, DAQ Permitting Section on May 11 and 21, 2020. The language will be revised as necessary for this permit modification. This project will cause changes to the emission limits, testing, notifications, monitoring and reporting requirements for the two existing wood-fired boilers (ID Nos. B1 and Boiler2), newly permitted No. 2 fuel oil-fired boiler (ID No. ES-Boiler4) and new emission limits, testing, notifications and MRRR for the proposed wood-fired boiler (ID No. ES-Boiler3) will be added as applicable per MACT Subpart DDDDD requirements. This rule became effective starting May 20, 2019 and will replace the 15A NCAC 02D. .1109 "112(j) Case-by-Case Maximum Achievable Control Technology" for the two existing wood fired boilers (ID Nos. ES-B1 and ES-Boiler2).

The proposed wood-fired boiler (57 million Btu per hour maximum heat input) will be combusting green wood sawdust per Form B1 (Boiler 3).

Review of eCFR:

§63.7499 What are the subcategories of boilers and process heaters?

The subcategories of boilers and process heaters, as defined in §63.7575 are:

(a) Pulverized coal/solid fossil fuel units.

…

(i) Stokers/sloped grate/other units designed to burn wet biomass/bio-based solid.

…

§63.7500 What emission limitations, work practice standards, and operating limits must I meet?

(a) You must meet the requirements in paragraphs (a)(1) through (3) of this section, except as provided in paragraphs (b), through (e) of this section. You must meet these requirements at all times the affected unit is operating, except as provided in paragraph (f) of this section.

(1) You must meet each emission limit and work practice standard in Tables 1 through 3, and 11 through 13 to this subpart that applies to your boiler or process heater, for each boiler or process heater at your source, except as provided under §63.7522. The output-based emission limits, in units of pounds per million Btu of steam output, in Tables 1 or 2 to this subpart are an alternative applicable only to boilers and process heaters that generate either steam, cogenerate steam with electricity, or both. The output-based emission limits, in units of pounds per megawatt-hour, in Tables 1 or 2 to this subpart are an alternative applicable only to boilers that generate only electricity. Boilers that perform multiple functions (cogeneration and electricity generation) or supply steam to common headers would calculate a total steam energy output using equation 21 of §63.7575 to demonstrate compliance with the output-based emission limits, in units of pounds per million Btu of steam output, in Tables 1 or 2 to this subpart. If you operate a new boiler or process heater, you can choose to comply with alternative limits as discussed in paragraphs (a)(1)(i) through (iii) of this section, but on or after January 31, 2016, you must comply with the emission limits in Table 1 to this subpart.

Table 1 to Subpart DDDDD of Part 63—Emission Limits for New or Reconstructed Boilers and Process Heaters

As stated in §63.7500, you must comply with the following applicable emission limits:

[Units with heat input capacity of 10 million Btu per hour or greater]

If your boiler or process heater is in this subcategory . . .	**For the following pollutants . . .**	**The emissions must not exceed the following emission limits, except during startup and shutdown . . .**	**Or the emissions must not exceed the following alternative output-based limits, except during startup and shutdown . . .**	**Using this specified sampling volume or test run duration . . .**
7. Stokers/sloped grate/others designed to burn wet biomass fuel	a. CO (or CEMS)	620 ppm by volume on a dry basis corrected to 3 percent oxygen, 3-run average; or (390 ppm by volume on a dry basis corrected to 3 percent oxygen,[d] 30-day rolling average)	5.8E-01 lb per MMBtu of steam output or 6.8 lb per MWh; 3-run average	1 hr minimum sampling time.
	b. Filterable PM (or TSM)	3.0E-02 lb per MMBtu of heat input; or (2.6E-05 lb per MMBtu of heat input)	3.5E-02 lb per MMBtu of steam output or 4.2E-01 lb per MWh; or (2.7E-05 lb per MMBtu of steam output or 3.7E-04 lb per MWh)	Collect a minimum of 2 dscm per run.

Table 2 to Subpart DDDDD of Part 63—Emission Limits for Existing Boilers and Process Heaters

As stated in §63.7500, you must comply with the following applicable emission limits:

[Units with heat input capacity of 10 million Btu per hour or greater]

If your boiler or process heater is in this subcategory . . .	**For the following pollutants . . .**	**The emissions must not exceed the following emission limits, except during startup and shutdown . . .**	**The emissions must not exceed the following alternative output-based limits, except during startup and shutdown . . .**	**Using this specified sampling volume or test run duration . . .**
7. Stokers/sloped grate/others designed to burn wet biomass fuel	a. CO (or CEMS)	1,500 ppm by volume on a dry basis corrected to 3 percent oxygen, 3-run average; or (720 ppm by volume on a dry basis corrected to 3 percent oxygen,[c] 30-day rolling average)	1.4 lb per MMBtu of steam output or 17 lb per MWh; 3-run average	1 hr minimum sampling time.

If your boiler or process heater is in this subcategory . . .	For the following pollutants . . .	The emissions must not exceed the following emission limits, except during startup and shutdown . . .	The emissions must not exceed the following alternative output-based limits, except during startup and shutdown . . .	Using this specified sampling volume or test run duration . . .
	b. Filterable PM (or TSM)	3.7E-02 lb per MMBtu of heat input; or (2.4E-04 lb per MMBtu of heat input)	4.3E-02 lb per MMBtu of steam output or 5.2E-01 lb per MWh; or (2.8E-04 lb per MMBtu of steam output or 3.4E-04 lb per MWh)	Collect a minimum of 1 dscm per run.

Information from the Notification of Compliance Status (NOCS) report submitted to FRO on September 23, 2019 was used to modify the Boiler MACT conditions.

- Boiler ES-B1 testing was performed on July 24, 2019 by Grace Consulting (Tracking No. 2019-133st)
- Boiler ES-Boiler2 testing was performed on July 23, 2019 by Grace Consulting (Tracking No. 2019-364st)

Per Section 4.2 of the NOCS the facility completed the required initial tune-up for all (Boilers 1 and 2) of the boilers and process heaters covered by 40 CFR Part 63 Subpart DDDDD according to the procedures in §63.7540(a)(10)(i) through (v) and the facility had an energy assessment performed according to §63.7530(e) according to Table 3 of Subpart DDDDD.

In addition, the following tables, inserted below from the NOCS:

Table 2-1
Subpart DDDDD Standards and Performance Test Results
Boiler 1
Troy Lumber Company – Troy, NC

Pollutant	Subpart DDDDD, Table 2 Limit	Performance Test Results[1]
HCl	2.2e-2 lb/mmBtu	3.88e-5 lb/mmBtu
Mercury	5.7e-6 lb/mmBtu	1.96e-7 lb/mmBtu
CO	1,500 ppmv @3% O_2	239.53 ppmv @3% O_2
PM (Filterable)	3.7e-2 lb/mmBtu	9.0e-3 lb/mmBtu

(1) Stack test reports are provided in Appendix A of this NOC.

Table 2-2
Subpart DDDDD Standards and Performance Test Results
Boiler 2
Troy Lumber Company – Troy, NC

Pollutant	Subpart DDDDD, Table 2 Limit	Performance Test Results(1)
HCl	2.2e-2 lb/mmBtu	5.82e-5 lb/mmBtu
Mercury	5.7e-6 lb/mmBtu	1.92e-7 lb/mmBtu
CO	1,500 ppmv @3% O_2	191.36 ppmv @3% O_2
PM (Filterable)	3.7e-2 lb/mmBtu	5.0e-3 lb/mmBtu

(1) Stack test reports are provided in Appendix A of this NOC.

Table 2-3
Subpart DDDDD Operating Parameters
Boilers 1 and 2
Troy Lumber Company – Troy, NC

Operating Parameters/ Compliance Methodologies	Operating Parameter Limitations		Averaging Period	Basis of Limit	Associated Emission Standard(s)
	Boiler 1	Boiler 2			
Maximum Opacity (%)	10	10	Daily	Subpart DDDDD, Table 4.4	PM
Minimum Oxygen Trim System Set-point (%)	4.43	5.36	N/A (Set-point)	July 2019 Performance Test	CO
Maximum Boiler Load (Steam lb/hr)	22,031	25,369	30 Day	July 2019 Performance Test	CO, Hg, PM

- Boiler ES-Boiler4 no testing has been performed to date. One ultra-low sulfur[156] distillate (No. 2) fuel oil-fired boiler (32.66 million Btu per hour maximum heat input), also permitted as a limited-use boiler (ID No. ES-Boiler4)[157]

The newly added No. 2 fuel oil-fired boiler (ID No. ES-Boiler4) is subject to the MACT DDDDD requirements as originally permitted (issued Permit No. 02330T23) and as modified during the facilities most recent permit modification (issued Permit No. 02330T24) for the following:

Excerpt from review for Permit No. 02330T24 issued February 7, 2020:
The applicant, Troy, is proposing to add an alternative operating scenario (AOS) to the changes made during processing of permit application (6200029.18B) which was issued on April 30, 2019 and included addition of one 32.66 million British thermal units per hour (million Btu/hr) ultra-low sulfur distillate fuel oil-fired boiler (ID No. ES-Boiler4). The facility would like to

[156] Ibid 12
[157] Ibid 11

change the primary operating scenario (POS) of this boiler to limited-use as defined in 40 CFR Part 63.7575 and make the current permitted scenario an AOS. Boiler 4 is only expected to operate when Boilers 1 and 2 (ID Nos. ES-B1 and ES-Boiler2) are being serviced.

A restriction will be added to this revised permit that only allows for operation of only 3 boilers at a time.[158] This restriction is due to the applicants request during permitting of Boiler 4 that it is only to be used as a backup and operated when Boilers 1 and 2 are down. Hence, emissions from this boiler were not be included in the PSD analysis (refer to 15A NCAC 02D .0530 above).[159]

Information from the NOCS report submitted to FRO on March 9, 2020 used to update the Boiler MACT condition is inserted below:

40 CFR §63.754S(e)(8): Certifications of Compliance:

- 40 CFR §63.7545(e)(8)(i): N/A – Troy Lumber is required to perform a tune-up of Boiler 4 once every five years. Boiler 4 commenced operation on January 10, 2020 and therefore, the first Boiler tune-up has not yet been performed on this unit.
- 40 CFR §63.754S(e)(8)(ii): N/A – As a limited use boiler, Boiler 4 is not required to have an energy assessment performed.
- 40 CFR §63.754S(e)(8)(iii): No secondary materials that are solid waste were combusted in any affected unit.

Per the Boiler MACT conditions provided by Mr. Voelker, a review of the Boiler MACT and the NOCS provided by Mr. Cole, FRO, the permit was updated accordingly.

14. 15A NCAC 02Q .0317 – Avoidance Conditions for 15A NCAC 2D. 0530: Prevention of Significant Deterioration

As presented in Section V.C.8.c. above, VOC, PM, NOx and CO_{2eqv} emissions exceed the PSD significance level for this project; therefore, subject to PSD. However, as previously discussed, the facility wishes to avoid triggering PSD for all pollutants, <u>except VOC</u>, by implementing the requested limits discussed under Section III.B. above (inserted below):

- ❖ Maximum combined lumber throughput to Kilns 1, 2, and 3 (ID Nos. ES-KILN-1, ES-KILN-2 and ES-KILN-3) of 265.41 MMBF/yr.
- ❖ Maximum combined heat input to <u>all Boilers</u> (ID Nos. ES-B1, ES-Boiler2, ES-Boiler3 and ES-Boiler4) of 669,731 million Btu/yr.

As detailed in Section 5.1 of the most recent application submittal received by the Division on April 1, 2020, calculations of maximum potential emissions from the installation of a new boiler

[158] Ibid 19
[159] Ibid 108

(ID No. ES-Boiler3) and the increased kiln and boiler throughputs result in emissions increases in exceedance of the PSD SER thresholds for several pollutants. Therefore, Troy Lumber is requesting the above permit limitations to limit future projected emissions of all pollutants other than VOC, to levels below PSD significance (i.e., the facility has performed a "past actual vs. future projected" analysis using the permit limitations).

The requested maximum combined annual lumber production throughput of less than 265.41 MMBF/yr lumber processed from all 3 kilns is included in the revised permit under 15A NCAC 02D .0530 (refer to the BACT condition under Section VI below).

The PSD Avoidance rule, 15A NCAC 02Q .0317 allows facilities to accept Federally-enforceable limits in their Title V permit in order to avoid triggering requirements of certain rules. Sections III. and V. above detail the purposed changes (e.g., proposed new sources, increase in utilization of existing sources, etc.) associated with this PSD project and emissions expected from this modification. Due to the number of affected sources (both existing and proposed) and the pollutants (i.e., VOC, PM, NOx, and CO_2 equivalent) that exceed the SER as detailed in Section V.C.8.c. above (excluding VOC), in order for this modification to avoid PSD from the increase in utilization of the boilers and PM sources this PSD Avoidance condition will be on a Facility-wide basis as follows:

Pollutant	PAE	BAE (2016 - 2017)	Delta (PAE-BAE)	PSD SER	PSD Avoidance Limitation (BAE + SER)
PM	93.72	63.99	29.72	25 tpy	Less than 88.99 tpy
NOx	125.45	38.86	86.59	40 tpy	Less than 78.86 tpy
CO_{2eqv}	119,489.69	36,529.83	82,959.86	75,000 tpy	Less than 111,529.83 tpy

The methodology provided in the revised application for future projected actuals does not accurately reflect post project operations (e.g., boilers). The emissions table provided, Table C-5.1: Annual Emissions from Wood-Fired Boilers - Criteria Pollutants and Hazardous Air Pollutants (partial excerpt below) used the requested maximum combined heat input to all boilers calculated based on projected tons of wood (sawdust) for the three wood-fired boilers of 84,116 tons from Table C-1: Troy Lumber Company Throughputs. The requested limit of 669,731 million Btu/yr for all boilers was presented in the application for the three wood-fired boilers dispersed between proposed Boiler 3 and existing Boiler 2, leaving existing Boiler 1 at zero.

Wood-fired Boiler(s) - Future Actual Emissions

Emissions Unit	Rated Capacities		FUTURE PROJECTED FUEL USAGE (mmBtu/Yr)	PM	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	VOC
Boiler 1 Wood-Fired - ES-Bl	*45*	*mmbtu/hr*	*0*	*0.11*	*0.11*	*0.01*	*0.025*	*0.22*	*0.17*	*0.02*
Boiler 2 Wood-Fired - ES-Boiler2	*29*	*mmbtu/hr*	*167,082*	*0.22*	*0.22*	*0.01*	*0.025*	*0.22*	*0.24*	*0.02*
Boiler 3 Wood-Fired - ES-Boiler 3	*57*	*mmbtu/hr*	*502,649*	*0.22*	*0.22*	*0.01*	*0.025*	*0.22*	*0.24*	*0.02*
Boiler ESP PM Control Efficiency:				*90.00%*	*90.00%*	*90.00%*				

Emissions Unit			PM	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	VOC
Boiler 1 Wood-Fired - ES-Bl	*Post Control*	*TPY*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Boiler 2 Wood-Fired - ES-Boiler2	*Post Control*	*TPY*	*1.8*	*1.8*	*0.1*	*2.1*	*18.4*	*20.0*	*1.4*
Boiler 3 Wood-Fired - ES-Boiler 3	*Post Control*	*TPY*	*5.5*	*5.5*	*0.2*	*6.3*	*55.3*	*60.3*	*4.3*
Total Future Actual Emissions (tpy)			7.3	7.3	0.2	8.4	73.7	80.4	5.7

This is not an accurate reflection of the projected emissions or post project operation since the facility plans to continue utilizing existing wood-fired Boiler 1 in addition to the No. 2 fuel oil-fired boiler (ID No. ES-Boiler4). Based on this methodology, as presented in the revised application there is no way to determine post project emissions (e.g., PM, NOx, CO_{2eqv}, HAPs and TAPs) from each of the two existing wood-fired boilers because they differ in size and the tested emission rates vary; thus, the PAE presented in Section V.C.8.b. above were based on the two-existing wood-fired boilers PTE per 15A NCAC 02D .0530(k).

Using the electronic spreadsheet provided, the applicant calculated future projected fuel usage and emissions by taking proposed boiler B3 at its PTE, which equals 502,649 million Btu/yr and using AP-42 NOx EF,[160] NOx equates to 55.29 tpy as calculated below:

$$57\ \frac{million\ Btu}{hr} * 8{,}760 \frac{hrs}{yr} = 502{,}649\ \frac{million\ Btu}{yr}$$

$$502{,}649\ \frac{million\ Btu}{yr} *\ 0.22\ \ \frac{lb\ NOx}{million\ Btu}\ = 55.29\ tpy\ NOx\ greater\ than\ SER$$

For existing B2, the applicant calculates the heat input by using the future projected boiler fuel usage (of all 3 wood-fired boilers) input limit of 84,116 tons from Table C-1: Troy Lumber Company Throughputs, converted to total combined heat input using a heating value of 3,981 Btu/lb[161], which equates to 669,731.59 million Btu/yr as calculated below:

$$84{,}116\ tons\ boiler\ fuel * 2{,}000\ \frac{lb}{ton} * 0.003981 \frac{million\ Btu}{lb}\ =\ 669{,}731.59\ \frac{million\ Btu}{yr}$$

Minus the annual heat input from proposed B3, equals heat input allocated to existing boilers:

$$669{,}731.59\ \frac{million\ Btu}{yr}\ -\ 502{,}649\ \frac{million\ Btu}{yr} = 167{,}082.59\ \frac{million\ Btu}{yr}$$

[160] Ibid 41 (NOx EF = 0.22 lb/million Btu)
[161] Heat value provided in Table C-5.1 calculation (0.003981 million Btu/lb)

Using the values above, as presented in the application, the remaining heat input was only allocated to existing B2; 167,042.78 million Btu/yr, which equates to 18.37 tpy NOx. Based on the calculations above, the future projected emissions minus baseline emissions for NOx equals:

$$PAE\ [(55.3 + 18.4) = \ 73.7\ tpy\ ]\ -\ BAE\ \left[\frac{(35.6 + 33.2)}{2}\ = 34.4\ tpy\ \right] = 39.3\ tpy\ NOx$$

Which is below the PSD SER of 40 tpy NOx as presented in Table 1 of the application [NOx (PAE – BAE) = 39.29 tpy NOx]. The BAE stayed the same as previous applications [NOx = (35.6+33.2)/2 = 34.4 tpy]. Yet, for future projected actuals the applicant allotted zero heat input for existing Boiler 1 as shown in the excerpt from the spreadsheet above, which is erroneous.

The applicant proposed the requested limits provided above to avoid triggering PSD for all pollutants, except VOC. As calculated above and discussed in the application submittals, NOx is the controlling pollutant. Throughout the application(s), the heat content of the green wood saw dust or "wet wood" used varies from the DAQ/EPA accepted default heating value of 4,500 Btu/lb[162] fuel on a wet, as-fired basis. Form B1 for the proposed Boiler 3 indicates the heat content is 3,940 Btu/lb for green wood saw dust, slightly less than the previous application submittal, Form B1 for green wood dust of 3,981 Btu/lb, which was used in Table C-5.1 of the most recent application submittal and calculation presented above. A lower heating value (Btu/lb) allows for an increased amount of fuel usage (i.e., approximately 10,000 tpy). Revised fuel usage (sawdust) in tons per year using a heating value of 4,500 Btu/lb is calculated below:

$$669{,}731.59\ \frac{million\ Btu}{yr} * \frac{10^6\ Btu}{million\ Btu} * \frac{lb}{4{,}500\ Btu}\ * \frac{ton}{2{,}000\ lb} = 74{,}414.6\ tpy\ "wet\ wood"$$

Based on the proposed tons of boiler fuel in Table C-1, the combined annual heat input to the 3 wood-fired boilers calculated using the approved fuel heating value of 4,500 Btu/lb exceeds the requested combined heat input to all boilers of 669,731 million Btu/yr in the application (calculation with the lower heating value of 3,981 Btu/lb for green wood shown above):

$$84{,}116\ tons\ boiler\ fuel * 2{,}000\ \frac{lb}{ton} * 0.004500\ \frac{million\ Btu}{lb}\ =\ 757{,}044\ \frac{million\ Btu}{yr}$$

The following additional restrictions and limitations will be included in the permit under a facility-wide PSD Avoidance condition to assure compliance with 15A NCAC .02D .0530(g) and the avoidance limits for each pollutant that exceeded the SER as discussed under Section V.C.8.c. above.

a. The maximum combined annual heat input of 669,731 million Btu/yr under the PSD Avoidance condition includes ALL boilers (i.e., existing wood-fired boilers B1 and Boiler2, proposed wood-fired Boiler3 and newly permitted No. 2 fuel-oil fired Boiler4), not just the three wood-fired boilers. Although emissions from the No. 2 fuel oil-fired boiler were not included in the PSD analysis, they are included under the PSD Avoidance condition to ensure

[162] Ibid 54

emissions associated with this modification do not exceed the SER due to the increase in utilization of all four boilers, especially NOx.

b. The revised permit will contain a restriction for future projected permitted silo throughput of no more than 132,827 tpy wood (sawdust), as presented in current application.
c. Operation of boiler 4 will be limited to instances where one of the two existing wood-fired boilers (i.e., ES-B1 and ES-Boiler 2) is down for maintenance, repairs, or other reasons.
d. Emissions must be calculated monthly and annually using the approved methodologies, emission factors, control device efficiencies and default heating values as presented in the calculations and tables below:

- Wood-fired boilers (ID Nos. ES-B1, ES-Boiler2 and ES-Boiler3) calculation with default heating value on a wet, as fired basis of 4,500 Btu/lb.[163]

Monthly:

$$\frac{lb\ sawdust\ used}{month} * \frac{4{,}500\ Btu}{lb\ HV} * \frac{million\ Btu}{1{,}000{,}000\ Btu} = heat\ input\ \frac{million\ Btu}{month}$$

$$\frac{lb\ sawdust\ used}{month} * \frac{0.0045\ million\ Btu}{lb\ wet\ wood} * EF\ \frac{lb\ Pollutant}{million\ Btu} * \frac{ton}{2{,}000\ lb} = \frac{tons\ Pollutant}{month}$$

Annually:

$$\frac{lb\ sawdust\ used}{yr} * \frac{4{,}500\ Btu}{lb\ HV} * \frac{million\ Btu}{1{,}000{,}000\ Btu} = heat\ input\ \frac{million\ Btu}{yr}$$

$$\frac{lb\ sawdust\ used}{year} * \frac{0.0045\ million\ Btu}{lb\ wet\ wood} * EF\ \frac{lb\ Pollutant}{million\ Btu} * \frac{ton}{2{,}000\ lb} = tpy\ Pollutant$$

For CO_2 equivalent[164] – EF are in lb Pollutant (i.e., CO_2, CH_4, and N_2O) per million Btu (converted from kg/million Btu as provided in Tables C-1 and C-2 to Subpart C of Part 98) and must be adjusted by the global warming potentials from Table A-1 to Subpart A of Part 98):

The CO_2, CH_4, N_2O emissions are converted to a CO_{2eq} basis by multiplying by their respective global warming potentials (GWP). GWP for CO_2, CH_4, N_2O are 1, 25, 298, respectively.

$$\text{CO2 equivalent} = (\text{CO2} * 1) + (CH4 * 25) + (N2O) * 298)$$

[163] Ibid 54
[164] Ibid 28

- No. 2 Fuel Oil-fired boiler with default heating value for No. 2 fuel oil of 140,000 Btu/gal[165]

Monthly:

$$\frac{gallons\ fuel\ consumed}{month} * \frac{140{,}000\ Btu}{gallon\ fuel} * \frac{million\ Btu}{1{,}000{,}000\ Btu} = heat\ input\ \frac{million\ Btu}{month}$$

$$\frac{gallons\ fuel\ consumed}{month} * \frac{EF\ lb\ Pollutant}{1{,}000\ gallon} * \frac{ton}{2{,}000\ lb} = \frac{tons\ Pollutant}{month}$$

Annually:

$$\frac{gallons\ fuel\ consumed}{year} * \frac{0.14\ million\ Btu}{gallon\ fuel} = heat\ input\ \frac{million\ Btu}{month}$$

$$\frac{gallons\ used}{year} * \frac{EF\ lb\ Pollutant}{1{,}000\ gallon} * \frac{ton}{2{,}000\ lb} = tpy\ Pollutant$$

For CO_2 equivalent[166] – EF for No. 2 fuel oil are in lb Pollutant (i.e., CO_2, CH_4, and N_2O) per million Btu (converted from kg/million Btu as provided in Tables C-1 and C-2 to Subpart C of Part 98) and must be adjusted by the global warming potentials from Table A-1 to Subpart A of Part 98):

The CO_2, CH_4, N_2O emissions are converted to a CO_{2eq} basis by multiplying by their respective global warming potentials (GWP). GWP for CO_2, CH_4, N_2O are 1, 25, 298, respectively.

$$\text{CO2 equivalent} = (\text{CO2} * 1) + (CH4 * 25) + (N2O) * 298)$$

Monthly:

$$\frac{gallons\ fuel\ consumed}{month} * \frac{0.14\ million\ Btu}{gallon\ fuel} * \frac{EF\ lb\ Pollutant}{million\ Btu} * \frac{ton}{2{,}000\ lb} = \frac{ton\ Pollutant}{month}$$

Annually:

$$\frac{gallons\ fuel\ consumed}{year} * \frac{0.14\ million\ Btu}{gallon\ fuel} * \frac{EF\ lb\ Pollutant}{million\ Btu} * \frac{ton}{2{,}000\ lb} = tpy\ Pollutant$$

[165] US EPA AP-42, Section 1.3; 140,000 Btu/gallon is default heating value for No. 2 fuel oil per AP-42, Handbook of Energy Engineering and Cleaver Brooks Boiler Book – Table 1 (for light oil).
[166] Ibid 28

- Emission factors and control device efficiencies by pollutant:

Emission Source ID Nos.	Emission Source Description	NOx			
		EF	Units	Control Device Efficiency	Basis
ES-B1	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	0.22	lb/million Btu	Uncontrolled	US EPA AP-42, Section 1.6, Wood Residue Combustion in Boilers; Table 1.6-2
ES-Boiler2					
ES-Boiler3					
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	20	lb/10^3 gallon	Uncontrolled	US EPA AP-42, Section 1.3, Fuel Oil Combustion; Tables 1.3-1

Emission Source ID Nos.	Emission Source Description	CO			
		EF	Units	Control Device Efficiency	Basis
ES-B1	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	0.17	lb/million Btu	Uncontrolled	Test 2014-162ST
ES-Boiler2		0.24			Test 2014-061ST
ES-Boiler3		0.24			Test 2014-061ST and memorandum dated March 19, 2020 from Gary Saunders, SSCB to Judy Lee, Permits Branch; Review of 2014 Performance Test Results from Boiler 1 and Boiler 2 for Use as Emission Factors for PSD Applicability for New Boiler 3
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	5	lb/10^3 gallon	Uncontrolled	US EPA AP-42, Section 1.3, Fuel Oil Combustion; Tables 1.3-1

Emission Source ID Nos.	Emission Source Description	CO_2 equivalent			
		EF	Units	Control Device Efficiency	Basis
CO_2					
ES-B1	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	206.79	lb/million Btu	Uncontrolled	US EPA Mandatory Greenhouse Gas reporting rule: Subpart A and C; Tables C-1 and C-2 to Subpart C of Part 98
ES-Boiler2					
ES-Boiler3					
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	163.05		Uncontrolled	
CH_4					
ES-B1	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	0.016	lb/million Btu	Uncontrolled	US EPA Mandatory Greenhouse Gas reporting rule: Subpart A and C; Tables C-1 and C-2 to Subpart C of Part 98
ES-Boiler2					
ES-Boiler3					
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	0.0066		Uncontrolled	
N_2O					
ES-B1	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	0.0079	lb/million Btu	Uncontrolled	US EPA Mandatory Greenhouse Gas reporting rule: Subpart A and C; Tables C-1 and C-2 to Subpart C of Part 98
ES-Boiler2					
ES-Boiler3					
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	0.0013		Uncontrolled	

40 CFR 98 - Subpart A, Table A-1: Global Warming Potentials

CO_2	1
CH_4	25
N_20	298

CO_2 equivalent = [(CO_2 * 1) + (CH_4 * 25) + (N_2O * 298)]

Emission Source ID Nos.	Emission Source Description	Total PM (filterable + condensable)			
		EF	Units	Control Device Efficiency	Basis as documented and/or presented in application (No. 6200029.19A)
ES-B1	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	0.107	lb/million Btu	Tested EF - post multicyclones; 90% CE for ESP per AP-42 Chapter 1, Section 1.6.4 Controls	Test 2014-162ST
ES-Boiler2		0.217	lb/million Btu		Test 2014-061ST
ES-Boiler3		0.217	lb/million Btu		Test 2014-061ST and memorandum dated March 19, 2020 from Gary Saunders, SSCB to Judy Lee, Permits Branch; Review of 2014 Performance Test Results from Boiler 1 and Boiler 2 for Use as Emission Factors for PSD Applicability for New Boiler 3
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	3.3	lb/1,000 gallon	Uncontrolled	US EPA AP-42, Section 1.3, Fuel Oil Combustion; Tables 1.3-1 and Table 1.3-2
ES-KILN-1	Steam-heated indirect-fired continuous lumber drying kiln	0.02231	lb/MBF	Uncontrolled	NC DAQ Wood Kiln Emissions Calculator, Revision C (July 2007)
ES-KILN-2					
ES-KILN-3					
ES-PM	Planer mill wood waste collection system	1.2	lb/ODT	EF is post cyclone	NCASI Special Report No. 08-01, May 2088; Table 8.1
ES-SH	Trim saw and wood hog waste collection system	0.001744	lb PM generated/BD-FT	CE for PM is 85%	DAQ and NCASI methodology
ES-WCS	Sawmill wood (sawdust) collection system discharging to wood fuel silos controlled by cyclones	1	lb/ton sawdust	CE for PM is 85%	AIRS Database SSC-3-07-008-03
ES-WCS-2					

Emission Source ID Nos.	Emission Source Description	Total PM (filterable + condensable)			
		EF	Units	Control Device Efficiency	Basis as documented and/or presented in application (No. 6200029.19A)
Wood waste	Dry wood shavings truck loading	0.00134	lb/ton transferred	Uncontrolled	AP-42 Chapter 13, Section 13.2.4
Fugitive	Paved roads	0.11	lb/VMT	Uncontrolled	AP-42 Chapter 13, Section 13.2.1 Paved Roads and Section 13.2.2 Unpaved Roads
	Unpaved roads	4.9		CE of 50% for watering roads	

The existing Facility-wide PSD Avoidance condition for VOC emissions contained in Troy Lumber's permit under Section 2.2 A.2. will be replaced with the following PSD Avoidance condition incorporating the above limits and restrictions:

2. 15A NCAC 02Q .0317: AVOIDANCE CONDITIONS for Avoidance of 15A NCAC 02D .0530 PREVENTION OF SIGNIFICANT DETERIORATION

a. In order to avoid applicability of this regulation, 15A NCAC 02D .0530(g), facility-wide emission sources shall discharge into the atmosphere less than the limits of nitrogen oxides (NOx), particulate matter (PM), and carbon dioxide equivalent ($CO_{2\ eqv}$) per consecutive 12-month period as provided in the summary table below [15A NCAC 02D .0530]:

Regulated Pollutant	Limits/Standards	Applicable Regulation
Nitrogen oxides	Less than 88.99 tons per consecutive 12-month period	15A NCAC 02Q .0317 for 15A NCAC 02D .0530
Particulate matter	Less than 78.86 tons per consecutive 12-month period	
CO_2 equivalent	Less than 111,529.83 tons per consecutive 12-month period	

Testing [15A NCAC 02Q .0508(f)]

b. If emissions testing is required, the Permittee shall perform such testing in accordance with General Condition JJ. If the results of this test are above the limit given in Section 2.2 A.2.a above, the Permittee shall be deemed in noncompliance with 15A NCAC 02D .0530.

Production/Operational Limits [15A NCAC 02Q .0508(f)]

c. To ensure compliance with the avoidance limits above, the following production/operational limits shall apply:
   i. The maximum annual combined heat input to all boilers (ID Nos. ES-B1, ES-Boiler2, ES-Boiler3, and ES-Boiler4) shall not exceed 669,731 million Btu per year per consecutive 12-month period using DAQ approved default heating values of:

(A) 4,500 Btu/lb for wood residue (sawdust) on a wet, as-fired basis for the wood-fired boilers, and
(B) 140,000 Btu/gallon for the No. 2 fuel oil-fired boiler.

ii. The annual wood (sawdust) throughput from both wood fuel silos shall not exceed 132,827 tons per consecutive 12-month period sawdust.

Monitoring/Recordkeeping Requirements [15A NCAC 02Q .0508(f)]

d. The Permittee shall keep monthly records in a logbook (written or electronic format) of:
   i. The combined heat input to all boilers using DAQ approved heating values shall be recorded monthly;
   ii. The pounds of boiler fuel (wet wood/sawdust) input for each wood-fired boiler shall be recorded on a monthly basis;
   iii. The gallons of No. 2 fuel oil consumed shall be recorded on a monthly basis;
   iv. The tons of wood (sawdust) throughput from both wood fuel silos on a monthly basis.
e. The Permittee shall calculate and record the monthly heat input for all boilers determined by the following equations and DAQ approved default heating values:
   i. Monthly heat input for all boilers:

$$Total\ monthly\ heat\ input\ for\ all\ boilers = \sum[\text{monthly heat input}](ES-B1, ES-Boiler2, ES-Boiler3, ES-Boiler4)$$

   ii. Wood-fired boilers (ID Nos. ES-B1, ES-Boiler2 and ES-Boiler3) calculation for each boiler with default heating value on a wet, as fired basis of 4,500 Btu/lb:

$$\frac{lb\ sawdust\ used}{month} * \frac{4{,}500\ Btu}{lb\ HV} * \frac{million\ Btu}{1{,}000{,}000\ Btu} = heat\ input\ \frac{million\ Btu}{month}$$

   iii. No. 2 Oil-fired boiler calculation with default heating value of 140,000 Btu/gal:

$$\frac{gallons\ fuel\ consumed}{month} * \frac{140{,}000\ Btu}{gallon\ fuel} * \frac{million\ Btu}{1{,}000{,}000\ Btu} = heat\ input\ \frac{million\ Btu}{month}$$

NOx emissions

f. Each calendar month, the Permittee shall calculate and record the NOx emissions for the previous month and the previous 12-month period to ensure compliance with Section 2.2 A.2.a. above. Monthly NOx emissions, in tons, shall be calculated as follows:
   i. Consistent with General Condition LL., NOx emissions shall be determined by the following equations and emission factors:
      A. Monthly NOx emissions for all boilers:

$$Total\ monthly\ NOx\ emissions\ for\ all\ boilers = \sum[\text{monthly NOx emissions}](ES-B1, ES-Boiler2, ES-Boiler3, ES-Boiler4)$$

      B. Wood-fired boilers (ID Nos. ES-B1, ES-Boiler2 and ES-Boiler3) calculation for each boiler:

$$heat\ input\ \frac{million\ Btu}{month} * EF\ \frac{lb\ Pollutant}{million\ Btu} * \frac{ton}{2{,}000\ lb} = \frac{tons\ Pollutant}{month}$$

C. No. 2 Oil-fired boiler (ID No. ES-Boiler4) calculation:

$$\frac{gallons\ fuel\ consumed}{month} * \frac{EF\ lb\ Pollutant}{1{,}000\ gallon} * \frac{ton}{2{,}000\ lb} = \frac{tons\ Pollutant}{month}$$

D. NOx emissions factors:

Emission Source ID Nos.	Emission Source Description	NOx			
		EF	Units	Control Device Efficiency	Basis
ES-B1 ES-Boiler2 ES-Boiler3	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	0.22	lb/million Btu	Uncontrolled	US EPA AP-42, Section 1.6, Wood Residue Combustion in Boilers; Table 1.6-2
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	20	lb/10^3 gallon	Uncontrolled	US EPA AP-42, Section 1.3, Fuel Oil Combustion; Tables 1.3-1

CO_2 equivalent emissions

g. Each calendar month, the Permittee shall calculate and record the CO_2 equivalent emissions for the previous month and the previous 12-month period to ensure compliance with Section 2.2 A.2.a. above. Monthly CO_2 equivalent emissions, in tons, shall be calculated as follows:
   i. Consistent with General Condition LL., CO_2 equivalent emissions shall be determined by the following equations and emission factors:
      A. Monthly CO_2 equivalent emissions for all boilers:

$$Total\ monthly\ \mathrm{CO2}\ \text{equivalent}\ emissions\ for\ all\ boilers = \sum[\text{monthly CO2 eqv emissions}](ES-B1, ES-Boiler2, ES-Boiler3, ES-Boiler4)$$

B. Wood-fired boilers (ID Nos. ES-B1, ES-Boiler2 and ES-Boiler3) calculation for each boiler:

$$heat\ input\ \frac{million\ Btu}{month} * EF\ \frac{lb\ Pollutant}{million\ Btu} * \frac{ton}{2{,}000\ lb} = \frac{tons\ Pollutant}{month}$$

C. No. 2 Oil-fired boiler (ID No. ES-Boiler4) calculation:

$$\frac{gallons\ fuel\ consumed}{month} * \frac{0.14\ million\ Btu}{gallon\ fuel} * \frac{EF\ lb\ Pollutant}{million\ Btu} * \frac{ton}{2{,}000\ lb} = \frac{ton\ Pollutant}{month}$$

D. CO_2 equivalent emissions factors:

Emission Source ID Nos.	Emission Source Description	CO_2 equivalent			
		EF	Units	Control Device Efficiency	Basis
CO_2					
ES-B1 ES-Boiler2 ES-Boiler3	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	206.79	lb/million Btu	Uncontrolled	US EPA Mandatory Greenhouse Gas reporting rule: Subpart A and C; Tables C-1 and C-2 to Subpart C of Part 98
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	163.05		Uncontrolled	
CH_4					
ES-B1 ES-Boiler2 ES-Boiler3	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	0.016	lb/million Btu	Uncontrolled	US EPA Mandatory Greenhouse Gas reporting rule: Subpart A and C; Tables C-1 and C-2 to Subpart C of Part 98
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	0.0066		Uncontrolled	
N_2O					
ES-B1 ES-Boiler2 ES-Boiler3	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	0.0079	lb/million Btu	Uncontrolled	US EPA Mandatory Greenhouse Gas reporting rule: Subpart A and C; Tables C-1 and C-2 to Subpart C of Part 98
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	0.0013		Uncontrolled	

40 CFR 98 - Subpart A, Table A-1: Global Warming Potentials

CO_2	1
CH_4	25
N_20	298

CO_2 equivalent = [(CO_2 * 1) + (CH_4 * 25) + (N_2O * 298)]

E. The CO_2, CH_4, N_2O emissions are converted to a CO_{2eq} basis by multiplying by their respective global warming potentials (GWP). GWP for CO_2, CH_4, N_2O are 1, 25, 298, respectively. The sum of these 3 values equals CO_2 equivalent:

$$\text{CO2 equivalent} = (\text{CO2} * 1) + (CH4 * 25) + (N2O * 298)$$

Total PM emissions

h. Each calendar month, the Permittee shall calculate and record the PM emissions for the previous month and the previous 12-month period to ensure compliance with Section 2.2 A.2.a. above. Monthly PM emissions, in tons, shall be calculated as follows:
   i. Consistent with General Condition LL., PM emissions shall be determined by the following equations and emission factors:
      A. Monthly PM emissions for all sources:

$$\begin{gathered} Total\ monthly\ PM\ emissions\ for\ all\ sources = \\ \sum[boilers](ES-B1, ES-Boiler2, ES-Boiler3, ES-Boiler4) + \\ \sum[kilns](ES-KILN-1, ES-KILN-2, ES-KILN-3) + \\ \sum[planer\ mill](ES-PM) + \sum[trim\ saw\ and\ wood\ hog](ES-SH) + \\ \sum[waste\ collection\ system-wood\ fuel\ silos](ES-WCS, ES-WSC-2) + \sum[dry\ wood\ shavings\ truck\ loading](woodwaste) + \\ \sum[Paved\ and\ Unpaved\ Roads](fugutive) + \\ \sum[miscellaneous\ sources](PM\ miscellaneous) \end{gathered}$$

      B. Wood-fired boilers (ID Nos. ES-B1, ES-Boiler2 and ES-Boiler3) calculation for each boiler:

$$heat\ input\ \frac{million\ Btu}{month} * EF\ \frac{lb\ Pollutant}{million\ Btu} * \frac{ton}{2{,}000\ lb} = \frac{tons\ Pollutant}{month}$$

      C. No. 2 Oil-fired boiler (ID No. ES-Boiler4) calculation:

$$\frac{gallons\ fuel\ consumed}{month} * \frac{EF\ lb\ Pollutant}{1{,}000\ gallon} * \frac{ton}{2{,}000\ lb} = \frac{tons\ Pollutant}{month}$$

      D. Kilns (ID Nos. ES-KILN-1, ES-KILN-2 and ES-KILN-3) calculation for each kiln:

$$\frac{MBF}{month} * 0.02231\ \frac{lb\ PM}{MBF} * \frac{ton}{2{,}000\ lb} = \frac{tons}{month}\ PM$$

      E. Planer mill (ID Nos. ES-PM) wood waste collection system calculation:

$$1.20\ \frac{lb\ PM}{ODT} * \left(\frac{BF}{month} * 0.2\right) \frac{tons\ woodwaste}{month} * \frac{ton}{2{,}000\ lb} = \frac{tons}{month}\ PM$$

F. Trim saw and wood hog waste collection system (ID Nos. ES-SH) calculation:

$$0.00174\ \frac{lb\ PM\ generated}{BF} * \left(\frac{BF}{month}\right) * \frac{ton}{2{,}000\ lb} * \left(1 - \frac{85}{100}\right) = \frac{tons}{month}\ PM$$

G. Wood (sawdust) collection systems discharging to wood fuel silos (ID Nos. ES-WCS and ES-WCS-2) calculation:

$$1\ \frac{lb\ PM}{ton\ sawdust} * \left(\frac{ton\ sawdust}{month}\right) * \frac{ton}{2{,}000\ lb} * \left(1 - \frac{85}{100}\right) = \frac{tons}{month}\ PM$$

H. Dry wood shavings truck loading (wood waste) calculation:

$$\frac{tons\ wood\ waste\ transferred}{month} * 0.00134\ \frac{lb\ PM}{ton} * \frac{ton}{2{,}000\ lb} = \frac{tons}{month}\ PM$$

I. Paved and unpaved traffic (fugitive) calculation:

$$Paved\ roads\ \frac{VMT}{month} * \frac{lb\ PM\ Paved\ roads}{VMT} * \frac{ton}{2{,}000\ lb} = \frac{tons}{month}\ PM\ Paved\ Roads$$

$$Unpaved\ roads\ \frac{VMT}{month} * \frac{lb\ PM\ Unpaved\ roads}{VMT} * \frac{ton}{2{,}000\ lb} = \frac{tons}{month}\ PM\ Unpaved\ Roads$$

$$Fugitive\ traffic\ emissions\ = (PM\ Paved\ Roads + PM\ Unpaved\ Roads)\ \frac{tons}{month}$$

J. Tons of PM emissions per month from miscellaneous sources, where applicable

K. <u>Total PM emissions factors</u>:

Emission Source ID Nos.	Emission Source Description	Total PM (filterable + condensable)			
		EF	Units	Control Device Efficiency	Basis as documented and/or presented in application (No. 6200029.19A)
ES-B1	Wood-fired boiler controlled by two multicyclones followed by an electrostatic precipitator	0.107	lb/million Btu	Tested EF - post multicyclones; 90% CE for ESP per AP-42 Chapter 1, Section 1.6.4 Controls	Test 2014-162ST
ES-Boiler2		0.217	lb/million Btu		Test 2014-061ST
ES-Boiler3		0.217	lb/million Btu		Test 2014-061ST and Memorandum dated March 19, 2020 from Gary Saunders, SSCB to Judy Lee, Permits Branch; Review of 2014 Performance Test Results from Boiler 1 and Boiler 2 for Use as Emission Factors for PSD Applicability for New Boiler 3
ES-Boiler4	Ultra-low sulfur distillate fuel oil-fired boiler	3.3	lb/1,000 gallon	Uncontrolled	US EPA AP-42, Section 1.3, Fuel Oil Combustion; Tables 1.3-1 and Table 1.3-2
ES-KILN-1	Steam-heated indirect-fired continuous lumber drying kiln	0.02231	lb/MBF	Uncontrolled	NC DAQ Wood Kiln Emissions Calculator, Revision C (July 2007)
ES-KILN-2					
ES-KILN-3					
ES-PM	Planer mill wood waste collection system	1.2	lb/ODT	EF is post cyclone	NCASI Special Report No. 08-01, May 2088; Table 8.1
ES-SH	Trim saw and wood hog waste collection system	0.001744	lb PM generated/BD-FT	CE for PM is 85%	DAQ and NCASI methodology
ES-WCS	Wood (sawdust) collection system discharging to wood fuel silos controlled by cyclones	1	lb/ton sawdust	CE for PM is 85%	AIRS Database SSC-3-07-008-03
ES-WCS-2					

Emission Source ID Nos.	Emission Source Description	Total PM (filterable + condensable)			
		EF	Units	Control Device Efficiency	Basis as documented and/or presented in application (No. 6200029.19A)
Wood waste	Dry Wood Shavings Truck Loading	0.00134	lb/ton transferred	Uncontrolled	AP-42 Chapter 13, Section 13.2.4
Fugitive	Paved Roads	0.197	lb/VMT	Uncontrolled	AP-42 Chapter 13, Section 13.2.1 Paved Roads and Section 13.2.2 Unpaved Roads
	Unpaved Roads	2.37		CE of 50% for watering roads	

i. The NOx, PM, and $CO_{2\ eqv}$ emissions shall be recorded monthly. The Permittee shall be deemed in non-compliance with this condition and 15A NCAC 02D .0530 if these records are not created and maintained.

j. Each month, the Permittee shall calculate the total combined heat input and the resulting NOx, PM, and $CO_{2\ eqv}$ emissions (facility-wide) for the previous calendar month and the previous consecutive 12-month period using actual production data, emission rates and/or control efficiencies listed above, as appropriate. The Permittee shall be deemed in non-compliance with 15A NCAC 02D .0530 if the monthly production/operational limits and/or emissions are not monitored, calculated and/or if the emissions exceed the NOx, PM, and $CO_{2\ eqv}$ emissions limits and/or production/operational limits in Sections 2.2 A.2.a. and/or 2.2 A.2.c. above.

The above records shall be recorded monthly in a logbook (written or electronic format), maintained on-site and made available to officials of the Division of Air Quality (DAQ), upon request. The Permittee must keep each entry in the log and all required records on file for a minimum of five years. The Permittee shall be deemed in noncompliance with 15A NCAC 02D .0530 if these records are not recorded monthly in a logbook (written or electronic format), kept on-site and made available to DAQ personnel upon request.

Reporting Requirements [15A NCAC 02Q .0508(f)]

k. The Permittee shall submit a semiannual summary report of monitoring and recordkeeping activities given in Sections 2.2 A.2.d. through 2.2 A.2.j. above postmarked on or before January 30 of each calendar year for the preceding six-month period between July and December, and July 30 of each calendar year for the preceding six-month period between January and June. The report shall contain the following:
   i. The monthly heat input to each boiler and the combined heat input to all boilers using DAQ approved default heating values must be calculated for each of the 12-month periods over the previous 17 months;
   ii. The monthly pounds of boiler fuel (wet wood/sawdust) input for each wood-fired boiler for the previous 17 months;
   iii. The monthly gallons of No. 2 fuel oil consumed for the previous 17 months;
   iv. The monthly tons of wood (sawdust) through both wood fuel silos for the previous 17 months;

v. The monthly NOx, PM, and $CO_{2\ eqv}$ emissions for the previous 17 months. The emissions must be calculated for each of the 12-month periods over the previous 17 months, and
vi. All instances of deviations from the requirements of this permit must be clearly identified.

If testing is performed to verify the emission factors, control device efficiencies or fuel heating values above, the Permitted may submit a permit application to modify this PSD Avoidance condition. The source shall be responsible for ensuring, within the limits of practicality, that the equipment or process being tested is operated at or near its maximum normal production rate, or at a lesser rate if specified by the Director or his delegate.

VI. Best Available Control Technology Analysis

For this project, VOC emission increases are largely attributed to an increase in throughput from Kiln #1 and Kiln # 3 and the restart and conversion of Kiln #2 from batch to continuous operation. The projected actual VOC emissions (as determined under Section V.C.8.b. above) from all sources are:

Emission Source ID Nos.	PAE (tpy)
ES-B1	3.31
ES-Boiler2	2.14
ES-Boiler3	4.24
Tanks (ID Nos. IES-AST1 through IES-AST4)	0.014
Kilns (ID Nos. ES-KILN-1 through ES-KILN-3)	634.33

The proposed project is expected to increase VOC emissions from the kilns by 389.95 tpy using an approved NCASI EF of 4.78 lb/MBF[167]. Due to the significant increase in VOC emissions to the atmosphere from this project, a BACT review is required. BACT was only evaluated for the kilns due to potential VOC emissions from other sources (i.e., boilers and tanks) being less than 10 tpy. In addition, the boilers will be limited to less than their potentials as presented under the PSD Avoidance condition in Section V.C.14. above and will be subject to 40 CFR 63 (MACT), Subpart DDDDD.

The kilns are not included in any source category under 40 CFR 60, or 61. Lumber kilns are subject to 40 CFR 63 (MACT), Subpart DDDD; however, they are not required to meet any emission limits or work practice standards under this MACT.

[167] Ibid 29

A. Under PSD regulations, the basic control technology requirement is the evaluation and application of Best Available Control Technology (BACT):

BACT is defined in 40 CFR 51.166 (b)(12) as follows:

> *An emissions limitation...based on the maximum degree of reduction for each pollutant... which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.*

As evidenced by the statutory definition of BACT, this technology determination must include a consideration of numerous factors. The structural and procedural framework upon which a decision should be made is not prescribed by Congress under the Act. This void in procedure has been filled by several guidance documents issued by the federal EPA. The only final guidance available is the October 1980 "Prevention of Significant Deterioration – Workshop Manual." As the EPA states on page II-B-1, "A BACT determination is dependent on the specific nature of the factors for that particular case. The depth of a BACT analysis should be based on the quantity and type of pollutants emitted and the degree of expected air quality impacts." (emphasis added). The EPA has issued additional DRAFT guidance suggesting the use of what they refer to as a "top-down" BACT determination method. While the EPA Environmental Appeals Board recognizes the "top-down" approach for delegated state agencies,[168] this procedure has never undergone rulemaking and as such, the "top-down" process is not binding on fully approved states, including North Carolina.[169] The Division prefers to follow closely the statutory language when making a BACT determination and therefore bases the determination on an evaluation of the statutory factors contained in the definition of BACT in the Clean Air Act.

As stated in the legislative history and in EPA's final October 1980 PSD Workshop Manual, each case is different. The state must decide how to weigh each of the various BACT factors. North Carolina is concerned that the application of EPA's DRAFT suggested "top-down" process will result in decisions that are inconsistent with the Congressionally intent of PSD and BACT. The following are passages from the legislative history of the Clean Air Act and provide valuable insight for state agencies when making BACT decisions.

> "*The decision regarding the actual implementation of best available technology is a key one, and the committee places this responsibility with the State, to be determined on a case-by-case judgment. It is recognized that the phrase has broad flexibility in how it should and can be interpreted, depending on site.*
>
> *In making this key decision on the technology to be used, the State is to take into account energy, environmental, and economic impacts and other costs of the application of best*

[168] See http://es.epa.gov/oeca/enforcement/envappeal.html for various PSD appeals board decisions including standard for review.
[169]North Carolina has full authority to implement the PSD program, 40 CFR Sec. 52.1770

available control technology. The weight to be assigned to such factors is to be determined by the State. Such a flexible approach allows the adoption of improvements in technology to become widespread far more rapidly than would occur with a uniform Federal standard. The only Federal guidelines are the EPA new source performance and hazardous emissions standards, which represent a floor for the State's decision.

This directive enables the State to consider the size of the plant, the increment of air quality which will be absorbed by any particular major emitting facility and such other considerations as anticipated and desired economic growth for the area. This allows the States and local communities judge how much of the defined increment of significant deterioration will be devoted to any major emitting facility. If, under the design which a major facility proposes, the percentage of increment would effectively prevent growth after the proposed major facility was completed, the State or local community could refuse to permit construction, or limit its size. This is strictly a State and local decision; this legislation provides the parameters for that decision.

One of the cornerstones of a policy to keep clean areas clean is to require that new sources use the best available technology available to clean up pollution. One objection which has been raised to requiring the use of the best available pollution control technology is that a technology demonstrated to be applicable in one area of the country in not applicable at a new facility in another area because of the differences in feedstock material, plant configuration, or other reasons. For this and other reasons the Committee voted to permit emission limits based on the best available technology on a case-by-case judgment at the State level. [emphasis added]. This flexibility should allow for such differences to be accommodated and still maximize the use of improved technology."

Therefore, NC DAQ does not strictly adhere to EPA's "top-down" approach. Rather NC DAQ implements BACT in strict adherence with the statutory and regulatory language. As such, NC DAQ's BACT conclusions may differ from those of the applicant or US EPA.

BACT may be defined through an emission limitation based on the maximum degree of reduction of each pollutant subject to PSD regulation, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems, and techniques.

B. Search of the U.S. EPA's RACT/BACT/LAER Clearinghouse:

As part of the BACT assessment, a review was performed of previous BACT determinations made during the past ten years related to VOC emissions from lumber dry kilns (Process Code 30.800). First, the U.S. EPA's RACT/BACT/ LAER Clearinghouse (RBLC) was searched on April 8, 2019 and then an internet search was performed to determine whether unidentified kilns listed in the RBLC were indirect-fired, fueled by wood (sawdust, residues, shavings, waste, etc.) and/or continuous drying. In addition, the applicant submitted a table of 31 facilities with draft or final BACT determinations in Appendix F of the application (included as Attachment 3 to this review) that appear to have kilns similar in operation to the kilns located at the Troy Lumber

Mill (proposed kiln project). Most of these determinations require a work practice approach to limiting VOC emissions and none call for add-on VOC emissions controls. BACT is proper kiln design and work practices such as proper maintenance and operation, and proper temperature and process management. BACT is a VOC emissions limit per MBF of lumber dried and best work practices. In no case is an add-on device to control VOC emissions from a continuous or batch lumber drying kiln (direct or indirect-fired steam heated) considered to be BACT. Based on available data, BACT emission limits range from 3.5 to 6.2 lb VOC/MBF.

Troy Lumber is proposing a VOC emissions factor of 4.78 lb/MBF of lumber dried based on NCASI's updated emission factor[170] as presented above. Troy Lumber's kiln operating procedures to demonstrate compliance with BACT as provided in Appendix H of the application are included as Attachment 4 to this review.

C. BACT for VOC Emission Sources:

The VOC emissions from lumber kiln facilities are primarily generated as a result of drying the wood and to a lesser extent, wood combustion in the boilers to generate steam to provide the heat for drying the lumber. VOC emissions from southern yellow pine lumber kilns consist mainly of non-HAP organic compounds, primarily as alpha-pinene (α-pinene), as well as smaller quantities of other monoterpenes, such as betapinene and limonene. Other VOCs - methanol, phenol, formaldehyde, MEK, and acetaldehyde, are also emitted from the lumber during the drying process. The VOCs emitted from southern pine lumber drying consist of approximately 80-90 percent terpenes and pinenes, which are native compounds in the wood tissue. Emissions of these compounds are largely proportional to the amount of moisture removal from the lumber (e.g., the longer the lumber is dried, the higher the VOC emissions).

Per Section 6. BEST AVAILABLE CONTROL TECHNOLOGY REVIEW FOR VOCs of the application, during the lumber drying process, organic compounds present in the wood are released. The type and amounts of compounds released will depend on several factors related to the drying process, including the kiln temperature, the surface area of the wood material relative to its mass, initial moisture content, the amount of moisture removed from the material, as well as the wood species dried.

There are 5 steps in the EPA's "top-down" BACT determination method:

1. Step 1 – Identify Control Technologies

   The first step is to evaluate VOC control technologies potentially applicable to similar sources and emissions units. Based on a review of the application, RBLC database, NCASI and other relevant literature, industry guidance, PSD permits and reviews of similar facilities, other regulatory agencies data, and vendor data; the following control technologies were identified in the BACT analysis for VOC emissions from continuous kilns:

- Adsorption (Adsorbers)
- Condensation (Condensers)

[170] Ibid 29

- Incineration (Regenerative thermal or Catalytic Oxidation)
- Wet Scrubbers
- Activated Carbon or Biofiltration
- Process Controls and Optimization
- Work Practices

are the primary technologies evaluated for controlling VOC emissions from lumber drying kilns. The use of any of these control technologies first requires the kiln exhaust to be effectively captured. Unlike conventional kilns, continuous drying kilns do not have any vents, except for the burner bypass stack. With lumber continually entering and exiting through the doorways, the kilns cannot be sealed for total emissions capture.

It is technically possible to capture part of the VOC emissions by adding roof vents. To be effective, these roof vents must be located across the top of each doorway or above sections added on both ends of the kiln to not interfere with lumber drying/conditioning occurring across the entire length of the kiln. Bibler Brothers Lumber Company (currently owned by West Fraser) in Russellville, Arkansas installed vent hoods and a stack at each doorway of a continuous drying kiln to perform testing. The results estimate that half of the kiln exhaust stream is captured.[171]

Per Section 6, 1.12.1 BACT Assessment Step 1, of the application indicates the review of the RBLC did not reveal any facilities that have add on controls for lumber drying kilns, a search was also completed of VOC control technologies for other processes that could possibly be applied to a lumber drying kiln. Control technologies evaluated by the applicant were:

- Wet scrubbers
- Thermal and catalytic oxidizers
- Activated carbon or biofilters
- Condensers
- Process controls

2. Step 2 – Eliminate Technically Infeasible Control Options and Operational Practices

The second step is to evaluate the technical feasibility of the control devices identified in the first step and to reject those that are technically infeasible based on an engineering evaluation or on chemical or physical principles. The following criteria were considered in determining technical feasibility: previous commercial-scale demonstrations, precedents based on issued PSD permits, State requirements for similar sources, and ability to capture the exhaust gases from lumber kilns. Selection of a control technology is made on the basis of stream-specific characteristics such as flow rate, hydrocarbon concentration, temperature, and moisture content. Additional technical feasibility analyses for each control technology presented in

[171] Ibid 93 – PSD Final Determination Review (Bibler Brothers actual stack test data could not be located; however, the testing is mentioned in other PSD Determinations; such as, Southern Parallel Forest Products July 2018 Application).

Section 6 – 1.11 BACT Methodology and 1.12 BACT Determination for the Continuous Drying Kiln of the application are presented below:

Wet Scrubbers
The wet scrubbing control technology consists of a transfer of VOC compounds in the gas stream to the scrubbing liquor when the gas stream is contacted by the scrubbing medium. This technology is used in many control applications but is not well suited for VOC control for a lumber kiln. The primary VOCs expected from lumber kilns are monoterpenes (i.e. alpha pinene) which are not very soluble in water (low water solubility). Further, the viscous condensate that would be created would result in frequent plugging of the scrubbing equipment, hence eliminating scrubbing (wet scrubbers) as technically feasible for controlling VOC emissions from lumber kilns.

Regenerative Catalytic or Thermal Oxidation
The principles utilized in both a regenerative catalytic oxidizer (RCO) and regenerative thermal oxidizer (RTO) are based on simple chemistry and heat transfer phenomena. Oxidation technologies have been widely accepted as the most effective technologies for VOC destruction for a variety of process types.

Oxidation, or combustion, of VOC involves a chemical reaction between hydrocarbons and oxygen to form carbon dioxide (CO_2) and water vapor. Combustion of VOC emission streams occurs spontaneously at elevated temperatures, which are typically attained by combustion of an auxiliary fuel within the combustion zone of the oxidizer. The percent conversion of VOC to CO_2 and water is dependent upon temperature and residence time of the VOC in the fuel combustion zone.

Combustion of VOCs in the presence of a catalyst is referred to as "catalytic oxidation" and allows oxidation to occur at substantially lower temperatures, thereby requiring less auxiliary fuel to maintain the desired temperature. In an RCO the catalysts are typically based on a noble metal and can be contained in a fixed or fluidized bed. Despite the decreased oxidation temperature, process exhaust gas must still be preheated, typically through heat exchange or direct heating in a combustion chamber, prior to contact with the catalyst bed. Catalytic oxidizers are very sensitive to particle contamination and can normally only be used on very "clean" exhaust streams containing little or no particulate matter. Catalytic oxidation is not viable because monoterpenes and the wood combustion products contaminate the catalyst.

Regenerative thermal oxidation systems operate on the same principal of reacting VOC in the presence of oxygen at elevated temperatures; however, the heat generated by combustion of auxiliary fuel and VOC is "reused" to reduce the amount of auxiliary fuel necessary for VOC oxidation. VOC oxidation is accomplished by passing the emission stream being controlled through a heated "bed" of media such as ceramic packing to preheat the emission stream, followed by a final combustion zone in which auxiliary fuel is burned to "boost" the stream to the required combustion temperature. Exhaust from the combustion zone is then passed through another packed bed, which absorbs and retains heat until it can be used to preheat the exhaust stream. Airflow is periodically switched to allow beds through which hot exhaust gases have passed to preheat the emission stream prior to passing through the combustion

zone. Regenerative systems are typically designed to recover nearly all of the heat of combustion, greatly reducing auxiliary fuel requirements. Thermal oxidation is most economical when the inlet concentration is between 1,500 and 3,000 ppmv VOC[172], because the heat of combustion of the hydrocarbon gases is sufficient to sustain the high temperatures required for combustion without the addition of expensive auxiliary fuel.

In addition, capturing the exhaust from a continuous kiln is complicated because a large fraction of the exhaust would escape through the open ends (where the lumber enters and exits the kiln). These ends must remain open to support the continuous nature of the process. Adding forced exhaust inside the kiln will disrupt the humidity and temperature gradients required for heat transfer and lumber conditioning. The stickiness of the exhaust stream due to the presence of volatile resinous compounds may cause dampers to malfunction or excessive buildup resulting in blockages. When it arrives at the control device, the exhaust stream is expected to contain only a very dilute concentration of VOCs, be saturated with water, and be at a temperature between 150 and 160 °F.

The units must be designed to accommodate the highest kiln exhaust rate at lowest VOC concentrations and handle the lowest expected flow rate at the high exhaust rate at high concentrations. The range of exhaust flow rates and concentrations is so large the unit would overload and shutdown. In addition, the technical hurdle of effectively capturing and routing emissions to the control device (as discussed above testing at a similar facility estimates that half of the kiln exhaust stream is captured), renders this add-on control device as not feasible.

Activated Carbon or Biofilters

Carbon adsorption systems use an activated carbon bed to trap VOCs. As the exhaust gas stream passes through the activated carbon bed, VOC molecules are adsorbed onto the surface of the activated carbon, and clean exhaust gas is discharged to the atmosphere. A typical carbon adsorption system for continuous operation includes two activated carbon beds, such that one bed can be desorbing/idle while the other is adsorbing. When the activated carbon in one bed is spent and can no longer effectively adsorb VOC, the bed is taken offline for regeneration, and the VOC-containing gas stream is diverted to the fresh activated carbon bed. This switching allows for the source to operate continuously without shutting down. Regeneration of the sorbent can be achieved either via heating with steam or via vacuuming to remove VOC from the surface.

Activated carbon and biofilters are most commonly used in industrial applications. However, this technology is not recommended for controlling VOCs from lumber kilns. The gas stream from the lumber kiln is very high in moisture content. That moisture preferentially condenses onto the adsorbent surface leaving less area available for the VOC molecules thus reducing control efficiency. The control equipment sizing is also complicated by the variable flow rates. Most adsorption units are not recommended for the higher operating temperatures encountered with lumber kilns. Lumber kilns typically operate in a temperature range that is used to desorb VOC from activated carbon. Further, the viscous condensate from any

[172] Pollution Control Handbook for Oil and Gas Engineering, John Wiley & Sons, April 20, 2016; Author: Nicholas P. Cheremisinoff, PhD.

cooling system that could be utilized would result in frequent plugging of the adsorption equipment.

Depending on the application, well designed adsorber systems can typically achieve VOC control efficiencies of 95% - 98% at input concentrations between 500 and 2000 ppm in air.[173] Adsorption systems have been successfully used in industry types such as organic chemical processing, varnish manufacture, synthetic rubber manufacture, production of selected rubber products, pharmaceutical processing, graphic arts operations, food production, dry cleaning, synthetic fiber manufacture, pressure sensitive tape manufacturing, and other coating operations.

Per the application, carbon adsorption is not recommended for exhaust streams with greater than 50% relative humidity and temperatures greater than 150 °F[174] At high moisture content, water molecules begin to compete with the hydrocarbon molecules for active adsorption sites. This reduces the capacity and the efficiency of the adsorption system. In addition, high exhaust temperatures reduce the efficiency of the activated carbon in capturing hydrocarbons. The exhaust from a lumber drying kiln is saturated with moisture (well over 50% moisture) for extended periods of the drying cycle.

Exhaust temperature vary according to the drying cycle, in conventional batch kilns can regularly reach 180 °F[175] but can regularly exceed 200 °F per applicant. Given that the moisture content and temperature of the lumber dry kiln exhaust gases are not within the recommended range and that the technology has never been commercially applied to a lumber drying kiln, carbon adsorption is not considered a feasible control technology for lumber kilns. Adsorption is impractical because the high temperature required to desorb monoterpenes damages the absorption media. Carbon adsorption is not a feasible control technology.

Biofiltration offers a cost-effective alternative to traditional thermal and catalytic oxidation systems in limited situations. Because biofilters are dependent upon biological activity to destroy VOC, removal efficiencies of biofilters are widely variable. In limited applications, this control technology can provide a reduction in VOC emissions of 60 to 99.9%.[176]

Bio-filtration uses microorganisms on a media bed (sometimes referred to as a "bioreactor") to biologically degrade (oxidize) VOCs and convert them into CO_2 and water, much like a traditional thermal and catalytic oxidation process. In bio-filtration systems, the exhaust gas stream is passed through one or more beds of biomedia, such as compost or beds of packing using nutrient recycle material. As the emissions flow through the bed media, the pollutants

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[173] CATC Technical Bulletin, Choosing an Adsorption System for VOC: Carbon, Zeolite, or Polymers. EPA-456/F-99-004, May 1999

[174] Activated Carbon Adsorption For Treatment of VOC Emissions, Table 1: Evaluation of Alternative Treatment Processes; Presented at the 13th Annual EnviroExpo, Boston Massachusetts – May 2001, Austin Shepherd, P.E., C.I.H., CARBTROL Corporation: https://www.carbtrol.com/images/white-papers/voc.pdf

[175] Simpson, William T., ed. 1991. Dry Kiln Operators Manual. Agric. Handbook AH-188. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory

[176] EPA, Using Bioreactors to Control Air Pollution, EPA-456/R-03-003. ttps://www3.epa.gov/ttncatc1/dir1/fbiorect.pdf

are absorbed by moisture on the bed media and come into contact with the microbes. Depending on the volume of air required to be treated, the footprint of a biofiltration system can be excessive and take up significant acreage. All bio-filters are extremely sensitive to a number of exhaust stream characteristics including moisture content, temperature, VOC species and concentration and bed retention time.

Bio-filtration is an efficient control for a system that provides a consistent flow of VOC, pH balanced moisture, and lower operating temperature. There does not seem to be any manufacturer data for a bio-filtration system to control the exhaust gas stream with characteristics similar to that for lumber kilns. However, in a previous lumber kiln BACT analysis,[177] a vendor was able to provide rough estimates of necessary exhaust "conditioning" requirements and an estimated VOC control efficiency. The only conditioning requirement for this system is that the kiln exhaust gas temperature must be cooled to approximately 100 °F to achieve a temperature suitable for the biofiltration microorganisms to work effectively, since microorganisms in biofilters that break down the VOCs generally do not thrive at temperatures more than 110 °F.[178] Kiln exhaust temperatures throughout the kiln will vary from approximately 110 °F to 180 °F with an average exhaust temperature well above the 110 °F maximum for the microorganisms. Such high temperatures would readily kill the VOC-consuming microorganisms in the system.

NCASI does not have any specific available data on biofilter control for emissions of VOC from of lumber kilns. One would only expect approximately 60 to 70 percent VOC control because pinenes and terpenes are not well controlled by biofilters at all, but formaldehyde and methanol may be better controlled. This seems reasonable that water soluble compounds like formaldehyde and methanol will be well controlled in a biofilter (control efficiencies will be greater than 90 percent for these compounds), but based on available stack test data from the Weyerhaeuser OSB facility in Elkin, NC,[179] their press biofilter only achieves 13 percent control of total VOC. Since terpenes account for the majority of the lumber kiln emissions, a major technical uncertainty about this control option is whether or not the biofilter beds would periodically plug due to buildup of the "sticky" terpenes present in the kiln exhaust. The build-up of this "sticky" material would require more frequent replacement of the filter media and higher operating costs; thus, ruling this control device as technically infeasible. No system has been demonstrated in practice for cooling kiln exhaust streams to the appropriate temperatures; hence, the use of biofiltration is eliminated because of technical infeasibility.

<u>Condensation</u>

Condensers operate by separating volatile compounds in a vapor mixture from the remaining vapors by means of saturation followed by a phase change. Condensers are typically refrigerated to decrease the temperature to aid in saturation and therefore increase the

[177] Weyerhaeuser Greenville facility BACT Analysis (Application No. 7400252.05B)

[178] Biofilters operating at higher temperatures (130 ºF) utilizing thermophilic bacteria are used to treat organic hazardous air pollutants in wood products operations, but these biofilters are ineffective in treatment of terpenes (the predominant VOC in lumber kiln exhaust).

[179] Testing conducted in 2009 at the Weyerhaeuser NR Company, Elkin Facility. Results summarized in a memorandum dated March 30, 2010. (Air Quality Permit No. 05678T34)

removal efficiencies of the units. There are two common types of condensers used for VOC removal – surface and contact condensers.[180] The coolant does not contact the gas stream in surface condensation; the vapor condenses as a film on the cooled surface and then discharges to a collection tank. Conversely, the vapor stream is sprayed with a liquid coolant in a contact condenser. The VOCs contained within the waste coolant often create a disposal problem because they cannot be recycled or separated from the stream without additional processing.

Because the condenser's removal efficiency is highly dependent on the characteristics of the waste gas stream, they are only feasible for removing certain compounds. Compounds with high boiling points and low volatility are more easily condensable than compounds with low boiling points and high volatility. EPA recommends, as a conservative starting point for considering condensers as a control, that the VOCs have boiling points above 100 °F.[181]

Condensers have been successfully used (but usually in conjunction with other control equipment) in reducing organic emissions from petroleum refining, petrochemical manufacturing, asphalt manufacturing, coal tar dipping operations, degreasing operations, dry cleaning units, and sometimes the surface coating industry.[182]

Condensation requires that the exhaust stream be cooled to a temperature low enough such that the vapor pressure of the exhaust gases are lower than the VOC concentration of the exhaust gases. The primary constituent of the VOC in the exhaust gas stream from the lumber kilns is terpenes. In order to reduce the vapor pressure of terpenes low enough to use condensation would require the temperature of the exhaust stream to be lowered to 32 °F. Kiln exhaust is saturated with moisture for most of the drying cycle. At this temperature, the unit would plug up with ice from the water vapor. Typical lumber kiln exhaust concentrations are highly variable and usually below 1,000 ppm, per applicant. This technology is most effective for applications where there is high VOC concentration in the gas stream around 5,000 ppm. All available information indicates that it would be extremely challenging to control VOC emissions from lumber kilns and that condensation is not technically feasible to control VOC emissions from lumber kilns.[183]

<u>Work Practices Standards – Proper Operation and Maintenance</u>
The VOC emissions from lumber kilns are primarily generated as a result of drying the wood in the continuous kiln and to a lesser extent, wood combustion in the boilers. The naturally occurring VOCs in the lumber are driven off by the heat used to dry the lumber. Emissions of VOCs are largely proportional to the amount of moisture removal from the lumber (i.e., the lower the target moisture content or longer the lumber is dried, the higher the VOC emissions).

[180] EPA Control Techniques for Volatile Organic Compound Emissions from Stationary Sources, EPA 453/R-92-018, December 1992
[181] Avoca Incorporated (Application No. 0800044.16A)
[182] Ibid 181
[183] Ibid 67

Process control or optimization uses proper lumber kiln operation techniques which include the necessary process monitoring instruments, process control equipment, scheduled equipment inspection and maintenance in accordance with manufacturers' recommendations. Process controls are used to maintain proper moisture and temperature settings to optimize the kiln drying operation releasing moisture and VOCs for each batch cycle. Proper kiln temperature and humidity settings can minimize the VOCs emitted from lumber kilns. Proper maintenance and operation of lumber drying kilns can effectively reduce VOC emissions. Proper drying schedule and temperature should be selected based on moisture content and manufacturer's specifications. Routine maintenance should also be completed on kilns based on manufacturer's recommendations.

Over drying the lumber would result in diminished lumber quality as well as the release of additional VOCs. Lumber market specifications generally establish the maximum allowable moisture content for a given grade of lumber or end-use of the product.

Proper maintenance of the kiln will help maintain efficiency of the units and maximize the lumber drying capacity. Data is limited concerning the level of emissions reduction expected through proper maintenance and operation of a kiln.

This control technology is maintained for further consideration.

3. Step 3 – Ranking of VOC Control Technologies

Based on the results of Step 2 of the BACT analysis, all control technologies, except work practice standards – proper operation and maintenance were deemed technically infeasible. Therefore, work practice standards – proper operation and maintenance represents BACT for the control of VOC emissions from the steam-heated continuous lumber drying kilns.

4. Step 4 – Evaluate Control Options

In the fourth step, a cost effectiveness and environmental and energy impact analysis is required. If the top level of control is selected as BACT, then a cost effectiveness evaluation is not required. An element of the environmental impacts analysis is the consideration of toxic or other pollutant impacts from the control alternative choice. The economic analysis, if necessary, is generally performed using procedures recommended by the EPA's OAQPS Control Cost Manual (sixth edition).

The most stringent or "top" control option is the default BACT emission limit unless the applicant demonstrates, and the permitting authority in its informed opinion agrees, that energy, environmental, and/or economic impacts justify the conclusion that the most stringent control option is not achievable in that case. Upon elimination of the most stringent control option based upon energy, environmental, and/or economic considerations, the next most stringent control alternative is evaluated in the same manner. This process continues until BACT is selected. Work practice standards – proper operation and maintenance is the only remaining feasible technology for the continuous lumber drying kiln. The other control

technologies that were evaluated have not been proposed or demonstrated for use on a continuous lumber drying kiln; thus, infeasible as presented under Step 2 above.

Control Option	Cost/Ton	Economical	Environmental Impact	Energy Impacts
Proper maintenance and operation	$0	Yes	No significant impacts	None

No adverse economic, environmental, or energy impacts are associated with implementing work practices to limit VOC emissions from the continuous lumber kilns.

5. Step 5 – Summarize the selection of BACT

The final step is to summarize the selection of BACT. The DAQ and the applicant performed a search of the RBLC database for BACT evaluations for both indirect-fired and continuous steam heated lumber kilns (See Attachment 3 of this review). In addition, DAQ performed a review of similar facilities in NC and other states that have gone through BACT determinations/analysis for VOC emissions from continuous lumber kilns (i.e., indirect and direct-fired). All of the findings indicate that none of the facilities use any control devices for the control of VOCs for lumber kilns, but rather used work practice standards.

Work practice standards have long been recognized by the EPA and other regulatory agencies to be effective methods for limiting VOC emissions from lumber kilns. The PSD regulations require a work practice standard if, after consideration of the environmental, energy, and economics impacts of add-on control technology, it becomes infeasible to install controls. Work practices have been determined to be appropriate as BACT for the continuous drying kilns associated with this project. To minimize the volatilization of VOCs with high boiling points, work practices for these PSD regulated sources include process controls to maintain proper moisture and temperature settings to optimize the kiln drying operation and reduce VOC emissions. This practice keeps the wood from being overdried and is an appropriate work practice for VOCs.

Proper maintenance of the kiln will primarily affect the steam efficiency of the unit and the associated indirect emissions generated by the steam source (in this case, boilers). Proper maintenance will also maximize the lumber drying capacity achieved from a given quantity of fuel combustion. Proper operation of kilns primarily involves the thoughtful design of temperature profiles throughout the kiln and selection of final lumber moisture content. Operating the kiln at higher than ideal temperatures has the potential to drive off additional, higher molecular weight organic constituents from the wood. Similarly, drying the wood for a longer period of time to reach lower final moisture content has the potential to increase volatilization of organic constituents. Increasing the operating temperature of the kiln and over-drying the lumber would both increase the cost of operating a lumber drying kiln. In addition, if the lumber is too wet, the facility will lose grade. As such, the same conditions needed to minimize emissions from a kiln also minimize costs and increase profitability.

Process controls or optimization uses proper lumber kiln operation procedures, as provided by the applicant in Appendix H – Kiln Operating Procedures to Demonstrate BACT

(Attachment 4 to this review) which include the necessary process monitoring instruments, process control equipment, scheduled equipment inspection and maintenance in accordance with manufacturers' recommendations.

Troy Lumber proposes a work practices standard (Attachment 4) as BACT and an emission limit of 4.78 pounds VOC (as pinene) per thousand board feet (lb/Mbf),[184] which is within the range of EFs found in the RBLC database and used by other agencies as BACT.

The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined work practice standards of proper operation and maintenance consistent with the manufacturer's recommendation is BACT for VOC emissions from the continuous kilns, and the BACT emission limit is 4.78 lb/MBF of VOC as pinene from the continuous kilns as requested.

6. Proposed BACT

Based on the BACT analyses for the PSD project discussed above, the NCDAQ has determined the technology and limitations presented in the following table are BACT for the continuous kilns at Troy Lumber:

Emission Source	Pollutant	Control Technology or Work Practice	Proposed Emission Limit
Three indirect-fired steam heated continuous dry kilns (ID Nos. ES-KILN-1, ES-KILN-2, and ES-KILN-3)	VOC	Work practice standards	4.78 lb/MBF as pinene

DAQ is not imposing a "drying to appropriate moisture content" as required for some facilities in the RLBC search as a "work practice" to allow the facility the flexibility of operation.

- Calculation of Total VOC (lb/MBF) as pinene per DAQ guidance[185] is computed based on the following equation:

  VOC as pinene + methanol + formaldehyde =
  VOC as carbon (lb/MBF) * 1.133 + (1 - 0.65) * Methanol (lb/MBF) + Formaldehyde (lb/MBF)

  VOC pounds per MBF mass emission rate as measured on an "as carbon" basis adjusted using the EPA's Interim VOC Measurement Protocol for the Wood Products Industry – July 2007 referred to as "WPP1 VOC" (Wood Products Protocol 1 VOC).[186]

The BACT permit condition for the kilns is provided below and will be placed in the revised permit (Permit No. 02330T25) in Section 2.1 D. Kilns as follows:

[184] Ibid 29
[185] Ibid 30
[186] EPA's Interim VOC Measurement Protocol for the Wood Products Industry – July 2007 referred to as "WPP1 VOC" (Wood Products Protocol 1 VOC)

1. 15A NCAC 02D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

a. The Permittee shall comply with all applicable provisions, including the notification, testing, reporting, recordkeeping, and monitoring requirements in accordance with 15A NCAC 02D .0530, "Prevention of Significant Deterioration of Air Quality" as promulgated in 40 CFR 51.166.
   i. The following emission limits shall not be exceeded:

Emission Source	Pollutant	BACT Limit	Units	Technology
Continuous indirect-fired steam heated lumber kilns **(ID Nos. ES-KILN-1, ES-KILN-2, and ES-KILN-3)**	VOC (as pinene)	4.78	lb/MBF	Good design and operating practices
		634.33	tpy	

b. To ensure compliance with the emission limits given in Section 2.1 D.1.a. above, the Permittee shall not exceed a maximum combined lumber throughput of 265.41 million board feet (MMBF) per year of lumber dried in the three indirect-fired steam heated continuous kilns **(ID Nos. ES-KILN-1, ES-KILN-2, and ES-KILN-3)**.

Testing [15A NCAC 02Q .0508(f)]

c. If emissions testing is required, the testing shall be performed in accordance with General Condition JJ.

Monitoring/Recordkeeping [15A NCAC 02Q .0508(f)]

d. The Permittee shall operate and maintain the three continuous dry kilns **(ID Nos. ES-KILN-1, ES-KILN-2, and ES-KILN-3)** in accordance with the manufacturer's specifications or a site-specific plan[187] approved by the NC DAQ Regional Administrator. The Permittee shall record any maintenance performed on the kilns each month in a logbook (written or electronic format).
e. To ensure compliance with the limits in Section 2.1 D.1.a. above, the Permittee shall calculate the following:
   i. the monthly production rate and the 12-month production rate of the three indirect-fired continuous kilns **(ID Nos. ES-KILN-1, ES-KILN-2, and ES-KILN-3)**.
   ii. the monthly VOC emissions and the 12-month VOC emissions from the three indirect-fired continuous kilns **(ID Nos. ES-KILN-1, ES-KILN-2, and ES-KILN-3)**. VOC emissions shall be determined by multiplying the total amount of lumber dried in the kilns by an emission factor of 4.78 pounds of VOC emissions per thousand board feet (MBF) of lumber dried.
f. The Permittee shall record the production rates and VOC emissions specified in Sections 2.1 D.1.e.i. and D.1.e.ii. above each month in a logbook (written or electronic format).

[187] Troy Lumber Company (Application No. 6200029.19A) – Appendix H – Kiln Operating Procedures to Demonstrate BACT of revised application received April 1, 2020

Reporting [15A NCAC 02Q .0508(f)]

g. The Permittee shall submit a semiannual summary report of monitoring and recordkeeping activities given in Sections 2.1 D.1.d. through 2.1 D.1.f. above postmarked on or before January 30 of each calendar year for the preceding six-month period and on or before July 30 of each calendar year for the preceding six-month period. The report shall contain the following:
   i. The monthly volatile organic compound emissions from the three indirect-fired continuous kilns **(ID Nos. ES-KILN-1, ES-KILN-2, and ES-KILN-3)** the previous 17 months. The emissions must be calculated for each of the 12-month periods over the previous 17 months; and
   ii. The monthly quantities of lumber dried in the three indirect-fired continuous kilns **(ID Nos. ES-KILN-1, ES-KILN-2, and ES-KILN-3)** each kiln for the previous 17 months. The amount of lumber dried must be calculated for each of the 12-month periods over the previous 17 months.

   The Permittee shall be deemed in noncompliance with 15A NCAC 02D .0530 if the 12-month rolling production average exceeds 265.41 MMBF per year from the three indirect-fired continuous kilns **(ID Nos. ES-KILN-1, ES-KILN-2, and ES-KILN-3)** OR if the above requirements are not maintained.

Testing to verify the emission factor is not feasible. Emissions from the continuous kilns are not exhausted from stacks but through roof vents and open doors at both ends of the kilns. Protocols for testing the kilns without stacks would be difficult to establish.

VII. Air Quality Impact Analysis

The above BACT review for VOC emissions was done per the "source obligation" provisions of the PSD regulations 40 CFR 51.166(r) and in accordance with "source impact analysis" as per 40 CFR 51.166(k). When a significant emissions increase is projected to occur, PSD regulations [40 CFR 51.166 (k)] requires an applicant to perform an air quality analysis of the ambient impacts associated with the construction and operation of the proposed source(s) or modification be performed.

The main purpose of the air quality analysis is to demonstrate that new emissions emitted from a proposed major stationary source or major modification, in conjunction with other applicable emissions increases and decreases from existing sources, will not cause or contribute to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or PSD Increment (the amount of pollution an area is allowed to increase).[188] Currently, the EPA lists six major air pollutants that affect the quality of ambient air and established concentration limits for these pollutants known as the NAAQS. The six pollutants are:

- Ozone (O_3)
- Particulate Matter (PM_{10} and $PM_{2.5}$)
- Carbon Monoxide (CO)
- Sulfur Dioxide (SO_2)

[188] https://www.epa.gov/nsr/prevention-significant-deterioration-basic-information#AQA

- Nitrogen Dioxide (NO_2)
- Lead (Pb)

Generally, the analysis will involve an assessment of existing air quality, which may include ambient monitoring data and air quality dispersion modeling results; and predictions, using dispersion modeling, of ambient concentrations that will result from the applicant's proposed project and future growth associated with the project.

Class I areas are areas of special national or regional natural, scenic, recreational, or historic value for which the PSD regulations provide special protection. The Federal Land Manager (FLM), including the State or Indian governing body, where applicable, is responsible for defining specific Air Quality Related Values (AQRV's) for an area and for establishing the criteria to determine an adverse impact on the AQRV's. If a FLM determines that a source will adversely impact AQRV's in a Class I area, the FLM may recommend that the permitting agency deny issuance of the permit, even in cases where no applicable increments would be exceeded. However, the permitting authority makes the final decision to issue or deny the permit.

A. Air Quality Monitoring Requirements:

In accordance with the requirements of 40 CFR 51.166(m)(1)(i)(b), a project that results in a net significant emissions increase must contain an analysis of existing ambient air quality data in the area to be affected by the proposed Project. Since the project does result in a net significant increase of a PSD-regulated pollutant (VOC), this analysis is required.

Site Location - The coordinates for the Troy Lumber Mill are 35º 22' 12.9" N (latitude) and 79º 53' 33.3" W (longitude) and the elevation is approximately 600 feet above sea level. The terrain surrounding the site is predominantly forest and flat lands. Troy Lumber is located in a rural area just North of the city of Troy in Montgomery County along the Uwharrie National Forest border in western North Carolina near the Great Pee Dee River.

There are no NAAQS for VOC and as per 40 CFR §81.334 “Designation of Areas for Air Quality Planning Purposes” (North Carolina – Montgomery County) the National Ambient Air Quality Standards (NAAQS) are as mentioned below:

Pollutant	NAAQS Standards
TSP	Better than national standards
1971 Sulfur Dioxide NAAQS (Primary and Secondary)	Better than national standards
Carbon Monoxide	Unclassifiable/Attainment
1997 Annual PM2.5 NAAQS	Unclassifiable/Attainment
1997 24-Hour PM2.5 NAAQS	Unclassifiable/Attainment
2006 24-Hour PM2.5 NAAQS	Unclassifiable/Attainment
NO2 (1971 Annual Standard)	Cannot be classified or better than national standards
1997 8-Hour Ozone NAAQS (Primary and Secondary)	Unclassifiable/Attainment
2008 8-Hour Ozone NAAQS (Primary and secondary)	Unclassifiable/Attainment

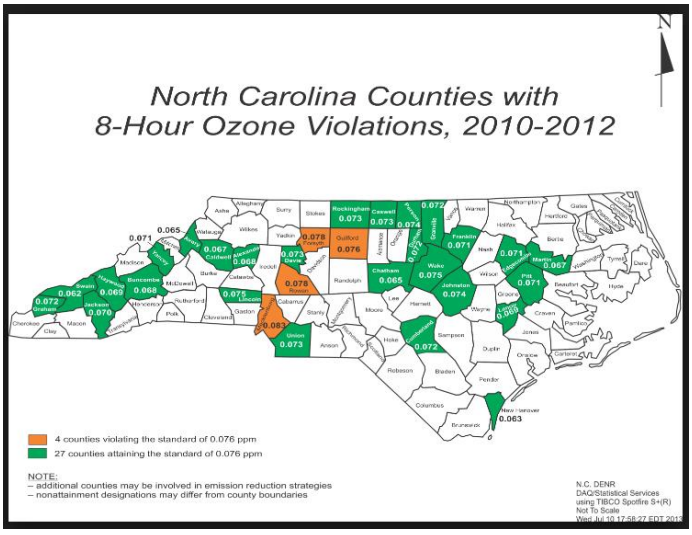
Montgomery County is considered an attainment/unclassifiable/better than national standards area with respect to ozone (O_3), PM, $PM_{2.5}$, CO, NO_2 or SO_2.

However, 40 CFR 51.166(m)(1)(ii) calls for "the plan … with respect to any such pollutant for which no National Ambient Air Quality Standard exists, the analysis shall contain such air quality monitoring data as the reviewing authority determines is necessary to assess ambient air quality for that pollutant in any area that the emissions of that pollutant would affect."

The EPA has not established an acceptable ambient monitoring method for VOC emissions. Therefore, there are no modeling requirements for this pollutant.

B. Ozone Impact Analysis:

EPA has developed a Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for determining if a project's precursor emissions increases (i.e., VOC, NOx and SO_2)[189] are expected to impact secondary ozone or $PM_{2.5}$ formation. As shown below, only four NC counties are violating the 8-hour Ozone standard.[190] Montgomery County is attaining the 8-hour ozone standard:



The proposed project will increase the emissions of VOC and NOx, both of which are precursors to ozone (O_3) formation. Using EPA Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool to show compliance, as demonstrated below, the total project impacts are well below significant impact levels (SIL), thus the project is expected to have insignificant impacts on ozone concentrations to the air shed.

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[189] Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program, Section 4. Application of the MERPs to Individual Permit Applications, April 30, 2019

[190] NCDEQ DAQ website: https://deq.nc.gov/about/divisions/air-quality/air-quality-data/data-archives-statistical-summaries/detailed-raw-ozone-data/north-carolina-counties-8-hour-ozone-violations-2011-2013

Excerpt from Section 7-1.13 Modeled Emission Rates for Precursors (MERPs) of the application (revised where appropriate):

Troy Lumber performed a MERPs demonstration to show compliance with ozone using the proposed NCASI EF of 4.78 lb VOC/MBF and the MERPs values, established by EPA, for the North Eastern United States. Troy Lumber shows the project emission increases for VOC and NO_x compared to the North Eastern United States (US) MERPs as a percentage.

A project's emissions increases should be expressed as a percent of the MERPs for each precursor that requires PSD permitting and then summed. If combined precursor values are less than 100%, this indicates that the critical air quality threshold (e.g. Significant Impact Limit) will not be exceeded.

The calculation below shows that the project emissions are only ~~42.8 %~~ 35.8 % (application write up has 42.8 %, which is from a previous application) and such that air quality impacts of ozone from this project would be expected to be less than the critical air quality threshold.

Troy Mill conservatively selected the lowest VOC (2,068 tpy) and NOx (209 tpy) 8-hr daily maximum ozone MERP values for the Northeast U.S. based on the US EPA's June 5, 2018 Presentation entitled "Update on MERPs Guidance" (Tyler Fox and Kirk Baker from the US EPA/OAQPS/Air Quality Modeling Group meeting). [This review engineer performed internet searches for this presentation and guidance; however, searches yielded no results – "Site could not be reached" and nothing available on www.cleanairinfo.com. Thus, Table 4.1 & MERPs guidance dated April 30, 2019, Tier 1 Demonstration tool previously referenced and noted below, was used to check calculations presented in the latest application.]

Emission Increases from Appendix C calculations (See Table C-4.1):

EMIS NOx = 39.29 TPY
EMIS VOC = 351.77 TPY

MERP NOx = 209 (8-hr O_3 from NO_X) – Table 4.1 Northeast
MERP VOC = 2,068 (8-hr O_3 from VOC) – Table 4.1 Northeast

EMIS_NOx and EMIS_VOC are Troy's proposed emission increases for NOx and VOC (tpy). MERP_NOx and MEPR_VOC are the MERPs for NOx and VOC (tpy). If the sum of the ratios is less than 1, then the secondary ozone impacts are below the ozone SIL and the Troy Mill does not need to perform a cumulative analysis for ozone

$$\frac{\text{EMIS\_NOx}}{\text{MERP\_NOx}} + \frac{\text{EMIS\_VOC}}{\text{MERP\_VOC}} < 1 \qquad \frac{39.29}{209} + \frac{351.77}{2068} = 0.358 < 1$$

$$\frac{39.29}{209} + \frac{351.77}{2068} = 0.358 * 100\% = 35.8\% < 100$$

There is no Table C-4.1 in the latest application submittal. The emission rates provided above were found in Table C-2 of the latest application submittal. However, the VOC emissions increase presented above is based on the delta of PAE and BAE calculated with a VOC EF of 4.78 lb/MBF, which is incorrect (refer to Sections V.C.8.a. and V.C.8.b. above). Baseline emissions must be calculated using the approved VOC EF of 4.09 lb/MBF.

Revised calculation:
Troy Lumber Mill is located in the Southeast U.S.; thus, the revised calculation was performed using the MERP values from Table 4.1 for the lowest illustrative MERP values[191] (tpy) by precursor using DAQ's approved 4.09 lb VOC/MBF[192] for BAE and NCASI's EF of 4.78 lb VOC/MBF[193] approved for PAE:

A VOC emissions increase of 396.7 tpy is expected from this PSD project as calculated in Section V.C.8. above. The facility requested to limit NOx emissions to less than SER of 40 tpy (Refer to PSD Avoidance condition in Section V.C.14. above); thus, NOx emissions are only expected to be 39.3 tpy as shown in Table 1 of Section III above.

Emissions of NOx = 39.3 tpy per application (refer to PSD Avoidance condition above)
Emissions of VOC = 396.7 tpy Total Project expected increase (refer to Section V.C.8. above)

MERP NOx = 170 – Table 4-1 Southeast
MERP VOC = 1,936 – Table 4-1 Southeast

$$\frac{Emissions_{NOX}}{MERP_{NOx}} + \frac{Emissions_{VOC}}{MERP_{VOC}} < 1$$

$$\frac{39.3}{170} + \frac{396.7}{1{,}936} = 0.436 < 1 = 0.436 * 100\% = 43.6\% < 100$$

The revised percent is 43.6 using the lowest MERPs for NOx and VOC. A value less than 100% indicates that the critical air quality threshold will not be exceeded when considering the combined impacts of these precursors on 8-hour daily maximum O_3. The Significant Impact Limit (SIL) is not exceeded; thus, a NAAQS analysis is not required.

C. PSD Increment Tracking:

The minor sources baseline date for increment tracking under PSD was triggered on June 21, 1999 in Montgomery County for PM_{10} and NOx. Project increases for these two pollutants as calculated in Section V.C.8. above for PM_{10} are -0.827 tpy and requested limit for NOx emissions to less than SER of 40 tpy (Refer to PSD Avoidance condition in Section V.C.14. above) and are only expected to be 39.3 tpy as shown in Table 1 of Section III above.

[191] Ibid 190 – Table 4.1 NOTE: Illustrative MERP values are derived based on EPA modeling and EPA recommended SILs from EPA's final SILs guidance (US EPA, 2018).
[192] Ibid 2
[193] Ibid 29

PM_{10} = -0.827 tpy (-0.189 lb/hr)

$$-0.827\ tpy\ PM10 * \frac{yr}{8{,}760\ hr} * \frac{2{,}000\ lb}{ton} = -0.189 \frac{lb}{hr}\ PM10$$

NOx = 39.3 tpy (8.97 lb/hr)

$$39.3\ tpy\ NOx * \frac{yr}{8{,}760\ hr} * \frac{2{,}000\ lb}{ton} = 8.97 \frac{lb}{hr}\ NOx$$

Upon final review, the project increases for both pollutants will be added to page 2 of the permit cover letter.

D. Class II Area Visibility Impact Analysis:

Per PSD regulations, an evaluation of the impact of project emissions on visibility in Class II areas is required. Per 15A NCAC 02D .0530(c), all areas of the State are classified as Class II, except the following areas, which are designated as Class I:

1. Great Smoky Mountains National Park
2. Joyce Kilmer Slickrock National Wilderness Area
3. Linville Gorge National Wilderness Area
4. Shining Rock National Wilderness Area
5. Swanquarter National Wilderness Area

Thus, Montgomery County is considered a Class II Area. The visibility analysis is only required for those pollutants for which PSD review is triggered.

Visibility impairment (or haze) is caused by the scattering and absorption of light by suspended particles and gases in the atmosphere. Visibility impairment can be categorized into three general types: (1) widespread regionally homogeneous haze that reduces visibility in every direction from an observer, (2) smoke, dust, or colored gas plumes that obscure the sky or horizon relatively near sources (this class is also termed "plume blight"), and (3) bands or layers of discoloration or veiled haze appearing above the surrounding terrain.[194]

Pollutants of concern for potential visibility impairment are PM, NOx and SO_2. This project triggers PSD review for VOC only due to the facility requesting to limit NOx to less than SER. In addition to including a PSD Avoidance condition for NOx, the Division is adding a PSD Avoidance condition for PM and CO_2 equivalent emissions (Refer to PSD Avoidance condition under Section V.C.14 above). Thus, a visibility analysis is not necessary since no significant impacts are expected due to the SER for any pollutants of concern for potential visibility impairments not being exceeded.

[194] Protecting Visibility, An EPA Report to Congress, Executive Summary and Chapter 1; http://vista.cira.colostate.edu/improve/wp-content/uploads/2016/08/Protecting-Visibility-An-EPA-Report-to-Congress.pdf

E. Class I Area Visibility Impact Analysis:

Per PSD regulations, the protection of air quality and Air Quality Related Values (AQRV) at potentially affected nearby Class I areas needs to be reviewed. PSD regulation 40 CFR 51.166(p) provides an opportunity for the Federal Land Manager (FLM) to determine whether the proposed modification would have an adverse impact on the AQRV, including visibility, on any Class I areas.

As set forth in the Clean Air Act (CAA), the FLM for each Class I Area has the responsibility to protect the AQRVs at such areas, and to consider whether the new emissions from proposed major facilities will have an adverse impact on those values. Class I Areas are defined in the CAA as National Parks over 6,000 acres and wilderness areas and memorial parks over 5,000 acres that were established as of 1977.

Impacts from a proposed project are typically required if they are within 100 kilometers (km) of one or more Class I areas. The permitting authority should also notify FLMs of "very large sources" with the potential to impact a Class I area within their jurisdiction, even if the facility is beyond 100 kilometers from the Class I area. In practice, all sources within 200 (and sometimes 300) kilometers are included in the initial review because the term "very large sources" is not defined in the CAA.[195]

The nearest Class I area to Troy Lumber is the Linville Gorge National Wilderness Area located 186 km of the lumber mill. Per the application submittal there are five Class I areas located within 300 km (October 19, 1992 EPA guidance for modeling Class I area impacts is a 100 km range) of the Troy Lumber facility listed below:

- Linville Gorge National Wilderness Area (NC)
- Swanquarter National Wilderness Area (NC)
- Shinning Rock National Wilderness Area (NC)
- James River Face Wilderness (VA), and
- Cape Romain Wilderness (SC)

Per Section 7 – 1.16 Impact on Class I Visibility (Regional Haze Analysis) of the application submittal indicates that Class I evaluations for visibility are not required for this facility:

Based on the Federal Land Managers Air Quality Related Values Work Group (FLAG) 2010 Report, Class I evaluations for visibility are not required for a facility if the Q/D ratio for the project is less than or equal to 10 (as long as the Class I area is beyond 50 km from the site).

Per the USDA Forest Service website, the FLMs have developed a method to screen PSD permit applications to determine whether additional analyses of potential impacts to AQRVs may be warranted. Step 1 – PSD Screening Review - This methodology is based on the potential

[195] Prevention of Significant Deterioration (PSD) Review for the Eastern (R9) and the Southern (R8) Regions of the Forest Service; USDA Forest Service: https://webcam.srs.fs.fed.us/psd/index.shtml

emissions of certain pollutants as well as the distance to the Class I Area of interest and is referred to as "Q/d":

- "Q" is the sum of the annualized maximum hourly emissions of sulfur dioxide, nitrogen oxides, particulate matter, and sulfuric acid mist, in tons per year.
- "d" is the distance to the Class I Area, in kilometers.

If Q/d is less than 10, the FLM will not typically require any atmospheric dispersion modeling analyses to assess impacts to AQRVs; it is assumed that the proposed project will not adversely impact any air quality related values at the Class I Area. If Q/d is greater than 10, the additional analysis listed in Step 2 – Review of Atmospheric Modeling Results and PSD Application is requested from the applicant.

Per the applicant, the Q in the Q/d equation represents the increase in emissions of all visibility affecting pollutants (NOx, SO_2, PM, and H_2SO4) calculated based on maximum 24-hr emissions in tpy resulting from the project. The "Q" value for this project is equal to ~~68.3~~ 74.5 tpy and is based on the following individual pollutant emissions increase from this project [Values presented in the latest application were revised and new values incorporated where appropriate]:

PM = ~~24.99~~ 29.72 TPY
NOx = 39.29 TPY
SO_2 = ~~4.47~~ 5.48 TPY
Total (Q) = ~~68.75~~ 74.5

The "d" in the equation is based on the distance (km) from the site to the Class I area. The following table (revised Table 5.2 from application) shows that "Q/d" ratios for all five Class I areas are below the screening value of 10.

Class I Area	Distance to Class I (km)	~~Q/D Ratio~~	Q/d Ratio
Swanquarter	259	~~0.27~~	0.288
Linville Gorge	186	~~0.37~~	0.401
James River Face Wilderness	247	~~0.28~~	0.302
Cape Romain Wilderness	259	~~0.27~~	0.288
Shinning Rock	264	~~0.26~~	0.282

The proposed modification to the Troy Lumber Mill will not result in a significant increase for any pollutants (PM (including PM_{10} and $PM_{2.5}$), NOx or SO_2) of concern for potential visibility impairment. In addition, Step 1 screening above shows that the "Q/d" ratio is less than 10. Thus, it is assumed that the proposed project will not adversely impact any air quality related values at the Class I Areas. No further analysis is necessary.

Federal Land Managers were notified of the PSD project following the pre-application meeting held on September 10, 2018. Notification of the PSD project was transmitted via email from Mr. Tom Anderson, AQAB, to representatives of the U. S. Fish and Wildlife Service (USFWS), U. S. Forest Service (USFS), and the National Park Service (NPS).

In addition, letters were sent via US postal service and subsequent emails to the FLMs with the original application submittal and revised application submittals on May 1, 2019; June 25, 2019; and April 29, 2020. FLM representatives from the USFWS and USFS did not respond to the letter or email notifications with any comments or requests for more information. However, a response was received from Ms. Andrea Stacy, FLM for the NPS on April 29, 2020.

Email exchanges between Ms. Stacy and this review engineer on April 29, 2020 regarding the proposed project indicate that a Class I AQRV analysis is not required:

From: Stacy, Andrea <Andrea_Stacy@nps.gov>
Sent: Wednesday, April 29, 2020 5:22 PM
To: Lee, Judy <judy.lee@ncdenr.gov>
Cc: Bill Jackson <bjackson02@fs.fed.us>; Collins, Catherine <Catherine_Collins@fws.gov>; Melanie Pitrolo <mpitrolo@fs.fed.us>; Allen, Tim <tim_allen@fws.gov>; King, Kirsten L <kirsten_king@nps.gov>; Cheek, Denesia <Denesia_Cheek@nps.gov>; Shepherd, Don <Don_Shepherd@nps.gov>
Subject: RE: [EXTERNAL] RE: Troy Lumber Company PSD Application (Application No. 6200029.19A)

Judy,

Thank you for keeping the NPS informed of the proposed modifications at the Troy Lumber Facility in Montgomery County, NC. I want to confirm that a Class I AQRV analysis will not be necessary for NPS Class I areas for this permit. Please provide us with a copy of the draft and final permits and associated staff analyses, as we retain this information for our records.

Finally, I note that "Troy is requesting lumber production and boiler heat input limitations to avoid PSD for all pollutants other than VOC (as part of the future vs. projected actual analysis)." Please contact us in the future should Troy request to lift these throughput/input limitations. Thank you and let me know if you have any questions.

Regards,
Andrea Stacy

From: Lee, Judy
Sent: Wednesday, April 29, 2020 6:06 PM
To: Stacy, Andrea <Andrea_Stacy@nps.gov>
Cc: Bill Jackson <bjackson02@fs.fed.us>; Collins, Catherine <Catherine_Collins@fws.gov>; Melanie Pitrolo <mpitrolo@fs.fed.us>; Allen, Tim <tim_allen@fws.gov>; King, Kirsten L <kirsten_king@nps.gov>; Cheek, Denesia <Denesia_Cheek@nps.gov>; Shepherd, Don <Don_Shepherd@nps.gov>; Lee, Judy <judy.lee@ncdenr.gov>
Subject: RE: [EXTERNAL] RE: Troy Lumber Company PSD Application (Application No. 6200029.19A)

Andrea,

You are very welcome.

Based on the application submittal and our preliminary review the "Q/d" ratios for the Class I areas are less than 10. In addition, the closest Class I area is 186 kilometers. Thus, a Class I AQRV analysis would not be required.

Should anything change during our review, we will let you know.

Thanks,

Judy Lee

F. Additional Impact Analysis

The PSD regulations, 40 CFR 51.166(o), require the applicant to evaluate the additional impacts of air, ground and water pollution on soils, vegetation, and visibility caused by an increase in emissions of any regulated pollutant from the source or modification under review, and from associated growth. Associated growth is the general commercial, residential, industrial, and other growth that will occur in the area due to the source or modification.

1. Visibility

The proposed modification to Troy Lumber will not result in a significant increase of NOx, SO_2, or particulate. These are the pollutants that contribute to visibility impairment. With no significant increase occurring for these pollutants, there should not be an impact on visibility in and around the facility.

2. Vegetation and Soils

Per Section 7 – 1.14.2 Impact on Soil and Vegetation, of the application:

Predicted concentrations of VOC resulting from the Continuous Drying Kiln will not cause or contribute to violation of the NAAQS. Because the NAAQS were established to protect human welfare, no significant impacts on the soil are expected due to the proposed project. The Continuous Drying Kiln will utilize best available control technology to reduce potential emissions of VOC.

The effects of air pollution on vegetation can be classified into three distinct categories: acute, chronic, and long-term.

a. Acute effects are those resulting from a short exposure (< 1 month) to high concentrations.
b. Chronic effects refer to those developed from exposure to a threshold level of pollutant over months or years.

c. Long-term effects refer to abnormal changes in ecosystems and subtle physiological alterations in organisms.

Both acute and chronic effects are the result of an airborne pollutant acting directly on an organism while long-term effects can be indirectly caused by secondary effects such as changes in soil pH.

In addition to BACT, Troy Lumber Mill will utilize good working practices for equipment associated with the proposed Continuous Drying Kiln. The combination of BACT, good work practices, and minimal air quality impacts will result in minimal impact on the soil and vegetation in and around the site.

NOx emissions are much more likely than VOC emissions to contribute to ozone formation and harm vegetation and soils.[196] NOx enters the leaves of plants through openings known as stomata. Its presence in significant quantities may result in biochemical changes such as visible foliar injury, premature senescence, increased leaf abscission, and altered plant growth and yield as well as physiological effects including changes in photosynthesis, specific enzymes, metabolic pools, and the translocation of photosynthesis. High gaseous concentrations of NOx may lead to poor chlorophyll production and tissue damage. Symptoms of air pollution-related damage from NOx include reduction in growth rates, reduction in reproductive rates, direct foliar damage, and mortality. Damage to the plant ground cover could increase soil temperature, moisture stress, and/or increase runoff and soil erosion.

Troy Lumber has requested to limit NOx emissions to below SER in order to avoid triggering PSD for this pollutant (Refer to PSD Avoidance condition under Section V.C.14 above).

The applicant claims no adverse impact on vegetation or soils because of this project. This claim is reasonable given that there is no non-attainment area in and around Troy, NC.

3. Growth Impacts

No long-term growth in population is expected from this project. The Troy Lumber Mill expects temporary jobs associated with the project construction; however, they will not require any additional employees after the project is complete. Therefore, there will be no significant growth (in population or infrastructure) associated with the project.

During construction, Troy Lumber will minimize the impact on the surrounding environment by primarily focusing on reduction of the formation of fugitive particulates.

VIII. NSPS, NESHAP/MACT, PSD, Attainment, CAM, 112(r), Compliance Status, Zoning, PE Seal

NSPS – The facility is currently subject to a New Source Performance Standard (NSPS).

[196] Ibid 93

Troy Lumber is subject to NSPS under 40 CFR 60, Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units" (Refer to Regulatory Summary – Section V.C.7. above).

- Boiler 1 pre-dates NSPS requirements (placed into operation April 1986)[197]
- Boilers 2 through 4 are subject to NSPS Subpart Dc.

The kilns are not subject to any NSPS regulations. The proposed kiln modifications do not affect this status.

NESHAP/MACT – The facility is a major source of HAPs and is currently subject to Maximum Achievable Control Technology (MACT) Standards.

Troy Lumber is subject to two national emission standards for hazardous air pollutants (NESHAP):

- 40 CFR Part 63: Subpart DDDD (NESHAP for Plywood and Composite Wood Products) for Kilns 1 through 3
- 40 CFR Part 63: Subpart DDDDD (NESHAP for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters) for Boilers 1 through 4

The proposed project impacts applicability or standards under both of these NESHAP/MACT standards (Refer to Regulatory Summary – Sections V.C.12. and V.C.13. above).

In addition, the existing wood fired-boilers are currently permitted as subject to 15A NCAC 02D .1109 (112j) Case-by-Case MACT through May 19, 2019, which will be removed from Troy Lumber's permit during processing of this PSD modification and replaced with Subpart DDDDD. The initial compliance date for Subpart DDDDD was May 20, 2019.

PSD – The prevention of significant deterioration (PSD) regulations apply to new major stationary sources or existing major sources that propose a major modification. A major stationary source is one that has the potential to emit (PTE) 250 tpy of any PSD-regulated pollutant. The Troy Lumber facility currently has the PTE to emit VOC in an amount greater than 250 tpy and is considered a major stationary source under PSD regulations.

Troy Lumber is proposing to increase kiln production and add a new boiler and wood fuel silo; therefore, a PSD applicability analysis was required to determine if the project was a major modification. VOC emissions from this kiln project exceed PSD SER; thus, triggering PSD (Refer to Regulatory Summary – Section V.C.8. above).

Attainment – Montgomery County is considered an attainment/unclassifiable/better than national standards area with respect to O_3, $PM_{2.5}$, CO, NO_2, or SO_2 (Refer to Section VII.A. above).

The minor sources baseline date for increment tracking under PSD was triggered on June 21, 1999 for Montgomery County for PM_{10} and NOx (Refer to Section VII.C. above).

[197] Ibid 69

112(r) – Per Form A3 – 112(r) Applicability Information - The facility is not subject to Section 112(r) of the Clean Air Act requirements because it does not store one or more of the regulated substances in quantities above the thresholds in the Rule.

CAM – 40 CFR 64 requires that a continuous compliance assurance monitoring (CAM) plan be developed for all equipment located at a major facility, that have pre-controlled emissions above the major source threshold and use a control device to meet an applicable standard (Refer to Regulatory Summary – Section V.C.10. above) for more details.

The proposed and existing kilns are not controlled; thus, not subject to a CAM plan.

The existing and proposed wood-fired boilers are controlled by multicyclones and ESPs. However, they are not considered large PSEUs; thus, not subject to a CAM plan.

Newly permitted No. 2 fuel oil-fired boiler is not controlled; thus, not subject to a CAM plan.

Most sources of PM emissions are controlled by cyclones. However, these sources are not being modified as part of this project; thus, not subject to a CAM plan at this time. CAM will be evaluated in more detail during processing of Troy Lumber's renewal due by July 31, 2020.

Compliance Status

DAQ has reviewed the compliance status of this facility. The most recent full inspection was conducted by Mr. Jeffery Cole of the Fayetteville Regional Office (FRO) on May 22, 2019. This report indicates the facility is in compliance.

On May 29, 2020 a partial inspection – COVID-19 was conducted via telephone between Mr. Cole, FRO and Mr. William Talbert, Assistant Production Manager at Troy Lumber. Due to current COVID-19 restrictions, no physical inspection of the facility was performed. Based on the information obtained during the phone conversation, the facility appeared to be in compliance.

The previous inspection report dated May 31, 2018 conducted by Mr. Gregory Reeves, FRO indicated no problems were discovered during the physical inspection of the sources and records. According to Mr. Reeves, the facility was found to be in apparent compliance.

Per conversation with Mr. Cole, FRO on July 27, 2020, a Notice of Violation (NOV) is being issued to Troy Lumber for failure to notify, conduct and submit results from performance tests pursuant to NSPS Dc for Boiler No. 4 (ID No. ES-Boiler4). The NOV was dated the same day and sent to the facility. The required testing was completed on March 31, 2020; however, it has not been submitted to DAQ for review. At the time of this review, no response has been received from the facility.

Zoning Consistency Determination – A zoning consistency determination pursuant to 15A NCAC 2Q .0507(d) is required if expanding or adding new sources. The addition of the

proposed wood-fired boiler, Kiln #2 restart as a batch kiln; then operation of Kiln #2 as a continuous kiln, is considered an expansion.

The original application submittal did not contain a zoning consistency determination. The application was deemed incomplete and an additional information request was sent to the facility on April 24, 2019.

The applicant hand delivered a letter dated May 6, 2019 to Mrs. Cathy Maness, Town Clerk/Finance Officer, along with a copy of the application and Zoning Consistency Determination Form, notifying the town's planning and zoning department of their intention to construct the new boiler and modification of the kilns. The Town Manager of Troy, Mr. Greg Zephir, acknowledged acceptance of this notification and signed the Zoning Determination Form on May 6, 2019 indicating "the proposed operation is consistent with applicable zoning ordinance." A copy of the letter sent to the local zoning agency and determination were received by DAQ RCO on May 10, 2019.

PE Seal – Pursuant to 15A NCAC 02Q .0112 "Application requiring a Professional Engineering Seal," a professional engineer's seal (PE Seal) is required to seal technical portions of air permit applications for new sources and modifications of existing sources as defined in Rule .0103 of this Section that involve:

(1) design;
(2) determination of applicability and appropriateness; or
(3) determination and interpretation of performance; of air pollution capture and control systems.

A PE Seal was required for this PSD application (Application No. 6200029.19A) and was provided on Form D5 for the emissions calculations and Form Cs of the application. A PE Seal was not required for Permit Application No. 6200029.17A which has been consolidated into 6200029.19A.

IX. Facility Wide Air Toxics

This proposed PSD permit modification will not impact the facility's status with respect to toxic air pollutant (TAP) emissions. Session Law 2012-91 (House Bill 952) provides an exemption from NC's air toxics rules for certain sources of TAPs as long as the DAQ determines that the emissions from that facility will not pose an unacceptable risk to human health. The sources being modified in this project are subject to MACT standards that are exempt from the TAP rules (Refer to Regulatory Summary – Section V.C.11. above).

X. Facility Emissions Review

The table on the first page of this permit review presents the criteria pollutants (plus total HAP) from the latest available reviewed facility emissions inventory (CY 2018). The project emissions are discussed and summarized under Section V.C.8. above.

XI. Public Notice Requirements/EPA and Affected State(s) Review

40 CFR 51.166(q) requires that the permitting agency make available to the public a preliminary determination on the proposed project, including all materials considered in making this determination. With respect to this preliminary determination, the NCDAQ has followed and met the requirements of PSD regulations as follows:

A. Public Participation Requirements

In accordance with 40 CFR 51.166(q), Public Participation, the reviewing authority (NC DAQ) shall meet the following:

1. Make a preliminary determination whether construction should be approved, approved with conditions, or disapproved.

   This document satisfies this requirement providing a preliminary determination that construction should be approved consistent with the permit conditions described herein.

2. Make available in at least one location in each region in which the proposed source would be constructed, a copy of all materials the applicant submitted, a copy of the preliminary determination, and a copy or summary of other materials, if any, considered in making the preliminary determination.

   This preliminary determination, application, and draft permit will be made available in the Fayetteville Regional Office and in the Raleigh Central Office, with the addresses provided below.

   Fayetteville Regional Office
   Systel Building
   225 Green Street, Suite 714
   Fayetteville, NC 28301

   Raleigh Central Office
   Green Square Building
   217 West Jones Street
   Raleigh, NC 27603

   In addition, the preliminary determination and draft permit will be made available on the NC DAQ public notice webpage.

3. Notify the public, by advertisement in a newspaper of general circulation in each region (Montgomery County) in which the proposed source would be constructed, of the application, the preliminary determination, the degree of increment consumption that is expected from the source or modification, and of the opportunity for comment at a public hearing as well as written public comment.

   NC DAQ prepared a public notice (See Attachment 5) that will be published in a newspaper of general circulation in the region.

4. Send a copy of the notice of public comment to the applicant, the Administrator and to officials and agencies having cognizance over the location where the proposed

construction would occur as follows: Any other State or local air pollution control agencies, the chief executives of the city and county where the source would be located; any comprehensive regional land use planning agency, and any State, Federal Land Manager, or Indian Governing body whose lands may be affected by emissions from the source or modification.

NC DAQ will send the public notice (see Attachment 5) to the Troy Town Manager at 315 North Main Street, Troy, NC 27371 and manager@troy.nc.us as well as those on the official email distribution lists for PSD permit applications.

5. Provide opportunity for a public hearing for interested persons to appear and submit written or oral comments on the air quality impact of the source, alternatives to it, the control technology required, and other appropriate considerations.

   The NC DAQ public notice (see Attachment 5) provides contact information to allow interested persons to submit comments and/or request a public hearing.

   The proposed kiln modification project is subject to review under 15A NCAC 02D .0530, "Prevention of Significant Deterioration" (PSD), 02Q .0518, "Final Action," and 40 CFR 51.166. Because the proposed project request to increase the annual board foot limitation and allowable VOC emissions, removal of these existing limits will effectively increase the allowable VOC emissions on a ton per year basis, these limits will conflict with the PSD Avoidance limit for VOC in Section 2.2 A.2 of the current permit (02330T24). As such, this permitting action is considered a significant permit modification under 15A NCAC 02Q .0516 and the permit application is being processed as a one-step significant permit modification under 15A NCAC 02Q .0501(c), under which a construction and operating permit will be issued. Therefore, per 15A NCAC 02Q .0518, this permit modification is subject to a 45-day review by the EPA in addition to the 30-day public comment period required under 15A NCAC 02Q .0521.

XII. Proposed Permit Modifications

The existing permit (No. 02330T24) will be modified as follows:

***Insert Table from Permit prior to issuance

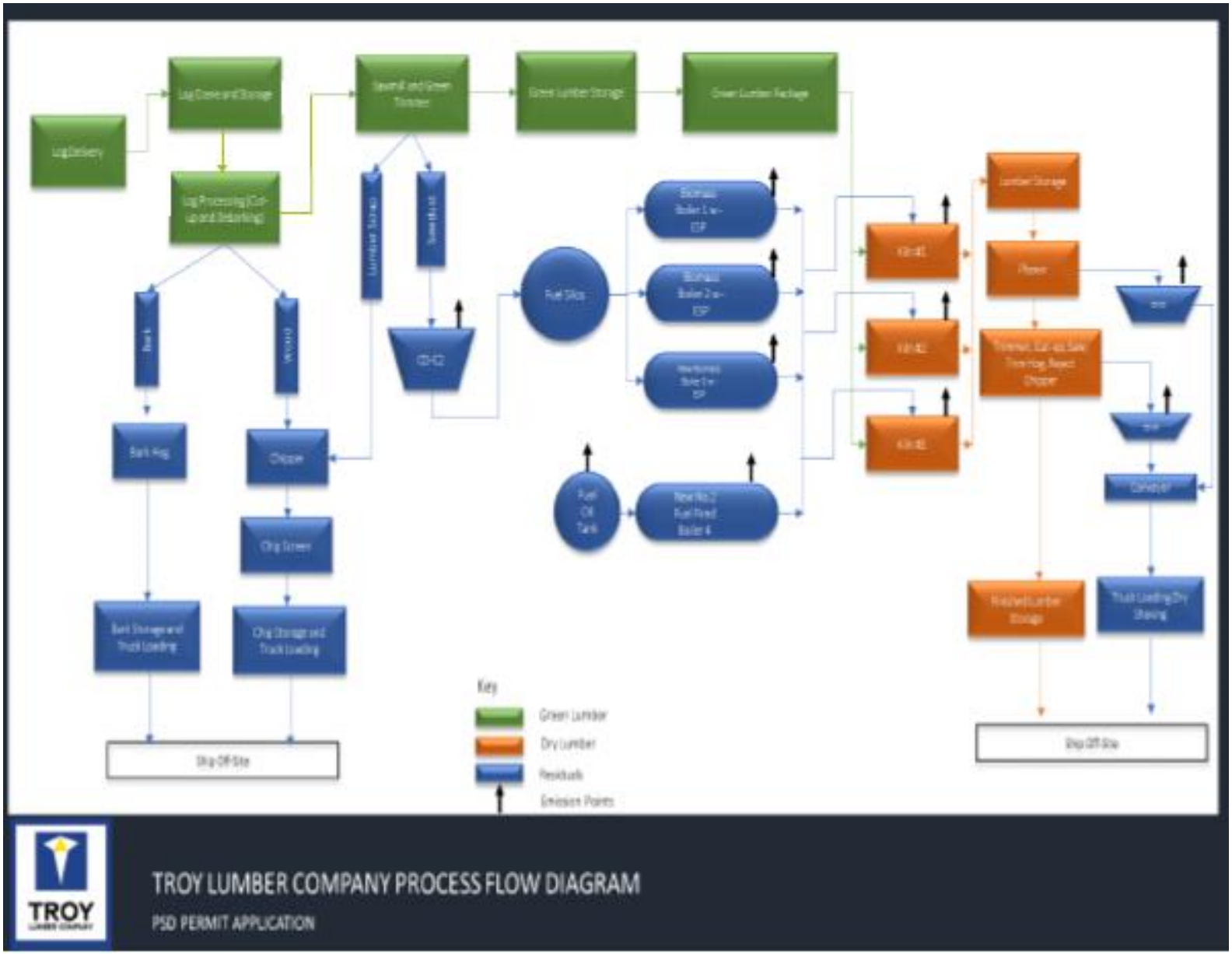
XIII. Conclusions, Comments, and Recommendations

A. The required application fee was received by the Division on April 1, 2019.
B. The required zoning consistency determination was received by the Division on May 10, 2019.
C. The required professional engineer (PE) Seal was received by the Division on March 12, 2019, June 14, 2019 and April 1, 2020. Each application submittal was sealed by Mr. John R. Field III, PE Seal No. 040609. Pages certified were emissions calculations and Form Cs for the first two submittals (2/22/2019 and 6/10/2019); and emission calculations and control efficiencies (3/24/2020).

Based on the applications submitted and the review of this proposal by the NCDAQ, the NCDAQ is making a preliminary determination that the project can be approved and a permit issued. A final determination will be made following EPA and Public notice and comment period after consideration of all comments.

Attachment 1 – Troy Lumber Company Site Map and Process Flow Diagram

ONE ENVIRONMENTAL GROUP	**Troy Lumber Co** **Figure 1** **Site Map**	110 Leslie Street Troy, North Carolina 27371	Approximate Property Boundary	Drawn: AE Checked By: MD Rev. Date: 3/27/20


Log Delivery
Log Processing (Cut-up and Debarking)
Chipper
Chip Screen
Fuel Silos
Key
Green Lumber
Dry Lumber
Residuals
Emission Points
TROY
TROY LUMBER COMPANY PROCESS FLOW DIAGRAM
PSD PERMIT APPLICATION

Attachment 2 – Troy Lumber Mill's TV Permit Timeline

UPDATE PRIOR TO ISSUANCE

Date	Permit No.	PSD Status	Permitting Event
12/XX/2020	**02330T25**	**Major**	**PSD Permit Issued** – BACT for VOC, PSD Avoidance for PM, NOx and CO2equivalent.
12/XX/2020	02330T24	Major	EPA review period ends
11/XX/2020	02330T24	Major	Public Comment period ends
10/XX/2020	02330T24	Major	Preliminary draft permit and review to Public Notice/EPA Review
10/XX/2020	02330T24	Major	Environmental Justice report XXXX
9/22/2020	02330T24	Major	Comments received from FRO on revised preliminary draft permit.
9/18/2020	02330T24	Major	Comments received from Troy Lumber on revised preliminary draft permit.
9/17/2020	02330T24	Major	Revised preliminary draft permit sent to Troy Lumber and FRO.
8/17/2020	02330T24	Major	Comments received from FRO on preliminary drafts.
8/13/2020	02330T24	Major	Comments received from Troy Lumber on preliminary draft permit.
8/10/2020	02330T24	Major	Comments received from SSCB on preliminary drafts.
8/3/2020	02330T24	Major	**Title V Renewal** – The renewal application was received via email by Mark Cuilla, RCO and forwarded to FRO.
7/30/2020	02330T24	Major	Preliminary draft permit sent to Troy Lumber, FRO and SSCB via email.
7/24/2020	02330T24	Major	Comments received from direct supervisor.
7/23/2020	02330T24	Major	Revised preliminary draft permit and review sent to supervisor.
7/20/2020	02330T24	Major	Modeling Memorandum received from AQAB indicating compliance with AAL's. DAQ performed an evaluation that indicates that there is no unacceptable risk to human health per Session Law 2012-91, House Bill 952 and pursuant to 15A NCAC 02Q .0706 "Modifications" and 02Q .0709 "Demonstrations"
6/16/2020	02330T24	Major	Preliminary draft permit and review sent to supervisor with placeholder language for toxics.
5/7/2020	02330T24	Major	Revised modeling analysis sent to AQAB for review.
4/2/2020	02330T24	Major	Modeling analysis received from Troy Lumber via email
4/1/2020	02330T24	Major	**Revised PSD Application** – Received in RCO from Troy Lumber to correct emission calculations, emission factors, erroneous control efficiencies, modeling, limits to avoid PSD, etc. (Application did not address all items)
3/2/2020	02330T24	Major	Teleconference with Troy Lumber's consultant and DAQ staff regarding application deficiencies
2/17/2020	02330T24	Major	Response from Troy Lumber's consultant - supplemental information for the PSD permit application (requested information not addressed)
2/14/2020	02330T24	Major	Bullet list of additional information requests for **PSD Application** (6200029.19A) sent to facility and consultant
2/7/2020	**02330T24**	Major	**Minor Modification** – Permit issued for modification to add an alternative operating scenario for the No. 2 fuel oil-fired boiler (ID No. ES-Boiler4)
12/27/2019	02330T23	Major	Application No. 6200029.20A received proposing addition of an alternative operating scenario to the changes made during processing of permit application 6200029.18B.
11/21/2019	02330T23	Major	Teleconference with Troy Lumber regarding "limited use boiler" Recapped most important items for PSD application
8/6/2019	02330T23	Major	Detailed email sent to Troy Lumber's consultant regarding application.
7/24/2019	02330T23	Major	**Site Visit –** RCO engineers toured Troy Lumber
6/14/2019	02330T23	Major	**Revised PSD Application** – To correct BAE throughout application, use of approved DAQ VOC EF for kilns, toxics, etc. (All items not addressed)
5/13/2019	02330T23	Major	**PSD Application** – Meeting with Troy Lumber and DAQ to discuss additional information requests (e.g., erroneous BAE, VOC EF, toxics, etc.)
5/10/2019	02330T23	Major	**Zoning Determination Received for PSD Application** – A copy of the letter sent to Mrs. Cathy Maness, Town Clerk/Finance Officer.

Date	Permit No.	PSD Status	Permitting Event
4/30/2019	**02330T23**	Major	**TV Minor Modification** – Permit issued for: Troy Lumber submitted two permit applications as follows: - Application No. 6200029.18A for a minor modification for the installation of two electrostatic precipitators (ESPs) on two existing wood-fired boilers; and - Application No. 6200029.18B for a minor modification to change the status of a 32.66 million British thermal units per hour (MMBtu/hr) No. 2 fuel oil-fired boiler from a temporary boiler to a new boiler.
4/24/2019	02330T22	Major	Additional information request sent to Troy Lumber
3/12/2019	02330T22	Major	**PSD Application** – Received in RCO. Considered both administratively and technically incomplete for processing. Administratively complete as of 5/10/2019 when zoning determination received.
9/25/2018	02330T22	Major	Application No. 6200029.18B received requesting the proposed temporary boiler – not yet permitted (requested with application No. 6200029.18A), be permitted as a permanent boiler by removing the restrictions on hours of operation and fuel usage necessary for temporary boiler status.
9/10/2018	02330T22	Major	**PSD** Pre-application meeting
5/17/2018	02330T22	Major	Application No. 6200029.18A requesting installation of two new ESPs that will be installed one each on two existing wood-fired boilers. Each ESP will be installed at the outlet of the existing multicyclone installed on each boiler and will result in a reduction of PM emissions. In addition, Troy is requesting the addition of a 32.66 MMBtu No. 2 fuel oil-fired temporary boiler.
5/1/2017	02330T22	Major	**Title V Permit Application** - (2nd Step) received – due before 5/25/2017. This application will be consolidated into their **PSD application**. Troy Lumber submitted this application to satisfy the requirement to file a Title V application within 12 months of commencing operation of Kiln 3. In addition, they request to undo the permit changes associated with permit 02330T19 (Application No. 6200029.15B)
5/25/2016	02330T22	Major	**Kiln #3 Startup –** Kiln #2 should be shutdown prior to Kiln #3 operating per Permit condition.
4/22/2016	02330T22	Major	**Administrative Amendment** – Correct typos, case by case limit and clarify Section 2.1 D.3 (Page 17) under 02Q .504 refers to Kiln #3 – modifications have already began
2/25/2016	02330T21	Major	**Title V Renewal** – The facility is considered PSD-Major, but is avoiding further PSD requirements by limiting facility-wide emissions of VOC
11/2/2015	02330T20	Major	**Administrative Amendment** – Correct references and Case-by-Case clarifications for hybrid operation of the kilns

Date	Permit No.	PSD Status	Permitting Event
10/5/2015	**02330T19**	**Major**	**Significant Modification** – Application was received by DAQ on March 3, 2015 from Troy Lumber. As the application clearly represented two distinct and separate projects for PSD purposes, the DAQ Permitting Section recommended the application be processed as two applications 6200029.15A and 6200029.15B (amended 9/22/2015). This action addressed issues not completed by Permit T18. These included: removing TAP requirements, exempted boilers from MACT 5D (provided they meet the definition of "hybrid" boiler) and allowed for Kiln 3 to operate provided Kiln 2 was shut down. TAP removal - "…there will not be an increase in the hourly emissions rate of any TAP. The yearly amount are actually expected to decrease due to the energy savings resulting from conversion to hybrid kilns." 02Q .0508(f) Requires notification not later than 120 days after: Kiln 3 operation Kiln 2 shut down Kiln 1 & 3 Hybrid operation Amended Title V Permit Application (2nd Step) within 1 year
7/29/2015	**02330T18**	**Minor**	**Significant modification** – Request to be reclassified as a PSD minor source with the acceptance of emission limitations. Entire facility emissions were limited to 250 tons per year VOC. The highest emissions of VOC appear to have been 240.01 tons in 2013. To ensure compliance with the new emissions limits, Troy Lumber proposes to limit the throughput through the combined two kilns (Steam Heated Kilns ES-KILN-1 and ES-KILN-2). The proposed operational limitation for PSD avoidance of **119.5** million board feet per year will ensure Troy Lumber will not be able to exceed 250 tons per year major source threshold. Troy Lumber also requested the boilers and kilns be exempted from the state air toxics rules since they are also subject to the 112(j) Case by Case MACT for Subpart DDDDD and the Plywood Composite Wood Products MACT Subpart DDDD. This request will be processed as part of a second application currently being processed (Application No. 6200029.15B issued Permit T19).
5/21/2013	02330T17	Major	**Applicability Determination** – Troy Lumber requested to relax the current permit restriction limiting heat input – permit modification required.
3/10/2011	**02330T17**	Major	**Title V Renewal** – Steam Heated Kiln ES-KILN-1 was previously converted in 2011 from a batch to continuous operation. No permit application needed. (See FRO's inspection report dated 02/24/2015).
6/10/2010	**02330T16**	Major	**State-only Modification** – Incorporation of toxics modeled emission rates as a result of the Director's SIC call for combustion sources. Nine TAPs exceeded the applicable TPERs, which are acrolein, arsenic, benzene, beryllium, cadmium, chlorine, formaldehyde, hydrogen chloride and manganese. Permit includes testing requirement and operational limits e.g., heat input rates, stack heights, and recordkeeping. "In brief, the Permittee has demonstrated compliance with the applicable AALs from the above 9 pollutants with predicted concentrations ranging from less than 1 percent (beryllium, chlorine and manganese) to 96 % (arsenic) of applicable AALs."

Date	Permit No.	PSD Status	Permitting Event
5/3/2010	02330T15	Major	**AQAB Memo –** "with the addition of the revised modeling, compliance is adequately demonstrated with either boiler operating at maximum capacity, as long as the 46,000 tpy combined total fuel use limit is enforced."
5/27/2010	02330T15	Major	**Director's Call –** Supplemental information
5/3/2010	02330T15	Major	**AQAB Memo –** Modeling analysis adequately demonstrates compliance with the AALs for all TAPs on a source-by-source basis.
3/30/2010	02330T15	Major	**Director's Call –** Permit application & TAPs Compliance modeling
9/24/2009	02330T15	Major	**Director's Call –** Toxics Compliance Demonstration for Combustion Sources
8/24/2009	02330T15	Major	**Dispersion Modeling Analysis** – "Director's Call"
5/6/2009	**02330T15**	**Major**	**Significant Modification** – Modification to kiln operating parameters increasing production capacity from **110 MBF/year** to **137.5 MBF/year** and change facility VOC PSD class to Major.
4/15/2008	02330T14	Minor	**Dispersion Modeling Analysis** – Significant Modification to increase permitted capacity of kilns.
5/4/2006	**02330T14**	Minor	**State-only/Section 502(b)(10)** – Addition of wood-fired boiler (ID No. ES-Boiler2; 28.69 million Btu per hour heat input) and associated control devices. The facility-wide VOC PTE reported in the application Form D-5 is 224 tpy
2/21/2006	**02330T13**	Minor	**Title V Renewal** – PM10 81.03 – CAM Evaluation Performed
3/30/2001	**02330T12**	Minor	**Initial Title V** – Title V due to VOC and CO exceed Title V threshold.
11/9/2000	**02330R11**	**Minor**	**Air Quality Construction and Operation Permit** – Troy Lumber has applied for a Title V permit in response to a Notice of Violation issued on 9 Jun 2000 for operating an unpermitted Title V source. Specifically, the facility has potential VOC emissions exceeding 100 tons per year from the lumber kilns. "Note that direct-fired kilns were originally listed on State air permits and were dropped as they either were closed or modified for indirect (steam) use. VOCs from kilns have never been fully evaluated, since until recently they were considered uncontrolled. Note that the original air permits did have the kilns but were later dropped during permit revisions at RCO." Kilns: ES-KILN-1 & ES-KILN-2 two steam heated lumber drying kilns (120,000 board feet charge capacity each)

Attachment 3 – US EPA's RACT/BACT/LAER Clearinghouse

Facility Name	RBLC ID	Facility State	Permit Number	Permit Issuance Date	Limits	Process	Notes
DELTIC TIMBER CORPORATION		AR	0592-AOP-R11	SUBMITTAL - 3/24/2015	VOC - 435.3 tpy, PM - 69.2 tpy, PM10 - 36.6 tpy	Lumber Kilns (SN-06, SN-12, SN-21)	Increase facility throughput, add a new small log processing system and related equipment additions and replacements.
GEORGIA PACIFIC WOOD PRODUCTS LLC - MCCORMICK SAWMILL	SC-0176	SC	1600-0002-CD	10/27/2016	VOC - 0	Lumber Kiln, direct fired, continuous	Kiln is a direct fired continuous lumber kiln fired on green wood and dried shavings. BACT is work practice standards and an emission factor of 5.84 lb VOC/1000 board feet
GEORGIA PACIFIC WOOD PRODUCTS, LLC - TALLADEGA SAWMILL	AL-0318	AL	309-0075	12/18/2017	VOC - 684.96, PM - 23.74		A sawmill that produces kiln dried dimensional lumber
GEORGIA-PACIFIC WOOD PRODUCTS LLC BELK CHIP-N-SAW FACILITY	AL-0312	AL	X006, X008, X009	5/26/2016	VOC - 5.4900 LB/MBF AS WPPI VOC	115,000 MBF/YR CDK D (ES-006) with 35 MMBTU/HR wood-fired and 7 MMBTU/HR natural gas-fired burners	None
GEORGIA-PACIFIC WOOD PRODUCTS SOUTH LLC (GURDON PLYWOOD AND LUMBER COMPLEX)	AR-0122	AR	463-AOP-R8	2/6/2015	VOC - 3.8000 LB/ 1000 BOARD FEET	SN-09 #4 Lumber Kilns	DIRECT FIRED
GEORGIA-PACIFIC WOOD PRODUCTS SOUTH LLC (WARRENTON CHIP-N-SAW FACILITY)		GA	2421-301-0003-V-03-1	6/30/2015	VOC - 5.49 lb/MBF	Direct-fired dual path continuous drying kiln No. 4 and No. 5	120 MMBF/yr with 42 MMBtu/hr burner
JORDAN FOREST PRODUCTS, LLC		GA	2421-171-0005-V-04-1	SUBMITTAL - 4/1/2016	VOC - 40 tpy, PM - 25 tpy	Direct natural gas-fired batch lumber drying kiln (Kiln No. 1-3), Direct natural gas-fired continuous lumber drying kiln (Kiln No. 4)	Request to remove the current limits of 90 MMBF/yr on Kiln No. 4 and 42 MMBF/yr for Kilns No. 1-3 combined. Requesting a new facility wide drying limit at 225 MMBF/yr
KAPSTONE CHARLESTON KRAFT LLC-SUMMERVILLE	SC-0163	SC	0900-0017-CE	1/20/2015	VOC - 225.6000 T/YR	Lumber Kilns	Installation of a new direct-fired lumber drying kiln along with ancillary equipment. This project will also increase the drying capacity for the facility from 118.448 MMBD-FT/YR to 194.825 MMBD-FT/YR.
KLAUSNER HOLDING USA, INC	SC-0149	SC	1860-0128-CA	1/3/2013	VOC - 3.5 LB/MBF PM (<2.5u) - 0.0040 LB/MBF	Lumber drying kiln EU007	None
NEW SOUTH COMPANIES, INC. - CONWAY PLANT	SC-0165	SC	1340-0029-CH-R2	10/15/2014	VOC - 602.0000 T/YR	Lumber Kilns	Facility is converting previously permitted steam heated continuous kiln to a direct-fired unit. This modification will put the drying capacity for the facility at 295.6 million BD-FT/YR.
NEW SOUTH COMPANIES, INC. - CONWAY PLANT	SC-0135	SC	1340-0029-CH	9/24/2012	VOC - 799.1800 T/YR	Lumber Kilns	Facility is going to install two (2) steam heated continuous kilns (each rated at 85 million BD-FT/YR), modify two (2) existing kilns. This project will allow facility to increase drying capacity from 173.2 million BD-FT/YR to 380.56 million BD-FT/YR.
NORTH FLORIDA LUMBER/BRISTOL SAW MILL	FL-0315	FL	0770007-014-AC (PSD-FL-407)	8/4/2009	VOC - 116.9300 T/YR	Wood Lumber Kiln	None
RESOLUTE FP U.S., INC. RESOLUTE FOREST PRODUCTS - ALABAMA SAWMILL	AL-0305	AL	309-0072-X002	6/24/2015	VOC - 3.7600 LB/MBF	Continuous Direct-Fired Lumber Dry Kilns with 35 mmbtu/hr Wood Fired Burner	None
SCOTCH GULF LUMBER, LLC FULTON SAWMILL	AL-0310	AL	X007 & X008	6/8/2017	VOC - 4.0 LB/MBF PM (Total) - 0	Existing, southern yellow pine sawmill with planer mill and lumber drying kiln X007 and X008	**X007**: 11.4 MBF/HR Continuous, direct-fired lumber dry kiln with 40 MMBTU/HR natural gas-gired burner and associated 4 MMBTU/HR natural gas-fired kiln condensate evaporator **X008**: Planer mill with pneumatic conveyance system and cyclone
SIMPSON LUMBER COMPANY, LLC	SC-0164	SC	1140-0008-CH	6/20/2014	VOC - 156.0000 T/YR	Lumber Kilns	Facility is going to construct new dual path direct-fired lumber kiln. Facility is also going to convert previously permitted steam heated continuous kiln to a direct-fired unit. This modification will put the drying capacity for the facility at 166 MMBD-FT/YR.

Facility Name	RBLC ID	Facility State	Permit Number	Permit Issuance Date	Limits	Process	Notes
SOUTHERN PARALLEL FOREST PRODUCTS		AL	711-5001	SUBMITTAL - 7/1/2018	VOC - 4.78 lb/MBF PM - 0.14 lb/MBF	Continuous drying kiln emission unit No. 009 using 35 MMBtu/hr burner	Proposing to construct and operate a direct fired Continuous Drying Kiln using a green sawdust fueled burner
TIN INC. DBA TEMPLE-INLAND (HOPE PARTICLEBOARD)		AR	1533-AOP-R12	SUBMITTAL - 11/6/2012	VOC - 534.2 tpy PM - 254 tpy PM10 - 222.8 tpy		Decrease total permitted emissions including 12.4 tpy of PM/PM10, 14.8 tpy of VOC
TIN INC. DBA TEMPLE-INLAND SOUTHWEST LOUISIANA LUMBER OPERATIONS	LA-0281	LA	PSD-LA-770	1/31/2014	VOC - 29.2700 LB/H	EP-3K -Wood-Fired Dry Kiln No. 1, 2, 3, 4	Annual throughput to 4 wood-fired dry kilns: EP-3K – Wood-Fired Dry Kiln No. 1; EP-4K – Wood-Fired Dry Kiln No. 2; EP-5K – Wood-Fired Dry Kiln No. 3; EQT009, & EP-6K – Wood-Fired Dry Kiln No. 4; shall be limited to no more than 240 MM BF/YR.
UNION COUNTY LUMBER COMPANY EL DORADO SAWMILL	AR-0124	AR	2348-AOP-R0	8/3/2015	VOC - 3.8000 LB/MBF PM - 0.0220 LB/MBF	Lumber drying kiln SN-01, SN-02, SN-03	SN-02 direct fired, MAX 18.5 MBF/HR, low NOX burners
WEST FRASER TIMBER CO. LTD NEWBERRY LUMBER MILL	SC-0151	SC	1780-0007-CG	4/30/2013	VOC - 3.7600 LB/MBF	Lumber Kilns (2), dual path, direct fired, continuous, 35 MMBTU/H, 15 thousand BF/H each	None
WEST FRASER TIMBER COMPANY, LTD - JOYCE MILL	LA-0252	LA	PSD-LA-701(M1)	8/16/2011	VOC - 990.0000 T/YR	Lumber kilns	None
WEST FRASER, INC. NEWBERRY LUMBER MILL	SC-0178	SC	1780-0007-CG-R2	9/30/2016	VOC - 0	Lumber Kilns No. 1 and No. 2, dual path, direct fired, continuous	None
WEST FRASER, INC. (ARMOUR LUMBER MILL)		NC	03248T29	10/9/2017	ES-K1-4 VOC - 96.26 tpy ES-CDPK-1/2 VOC - 182.4 tpy	Two (2) continous wood-fired steam heated drying lumber kilns (ES-CDPK1 & ES-CDPK2) and one (1) batch kiln (ES-K1-4)	No change
WEST FRASER, INC. (AUGUSTA MILL)		GA	2421-245-0047-V-06-0	SUBMITTAL - 12/1/2012	VOC - 146.57 tpy PM - 24.53 PM10 - 2.52	Two (2) new continous direct-fired kiln to operate with one (1) green sawdust gasifier burner at heat input capacity of 35 MMBtu/r	Proposing modifications to increase production capacity of kiln dried lumber to 220 MMBF/yr. Thee (3) direct batch lumber drying kilns (KD01, KD02, KD03) to be shut down
WEST FRASER, INC. (LEOLA LUMBER MILL)	AR-0135	AR	57-AOP-R6	8/5/2013	VOC - 3.5000 LB/MBF	Lumber Kiln, continuous, indirect	Two (2) new, continuous dual-path, indirect heated kilns replaced four bath, indirect heated kilns. The kilns are supplied with steam from multiple (existing) wood-fired boilers.
WEST FRASER, INC. (PERRY MILL)		FL	1230033-012-AC	SUBMITTAL - 4/1/2014	VOC - 3.5 lb/MBF PM - 8 lb/hr	Direct-fired lumber kiln with capacity of 90 MBF/yr	Replacement of two (2) indirect-fired lumber drying kilns with new direct-fired lumber kiln
WEST FRASER, INC. (SEABOARD LUMBER MILL)		NC	03937T25	6/20/2017	VOC - 376 tpy PM - 30 tpy PM10 - 18 tpy PM2.5 - 15 tpy	Two (2) new continous direct wood-fired double track lumber kilns (No. ES-DK)	Removing four (4) indirect steam heated batch lumber drying kilns and three (3) associated wood-fired boilers.
WEST FRASER, INC. (WHITEHOUSE MILL)		FL	0310197-011-AV	5/31/2011	VOC - 319.23 tpy PM - 21.60 tpy PM10 - 12.17 tpy PM2.5 - 9.91 tpy	Two (2) new continous dual track lumber kilns (No. ES-DK)	Removing two (2) indirect steam heated batch lumber drying kilns and three (3) associated wood and propane-fired boilers. Modifying existing steam batch lumber drying kiln No. 3
WEST FRASER, INC. LUMBER MILL	TX-0607	TX	PSDTX892M1	12/15/2011	VOC - 3.5000 LB/MBF	Lumber Kilns (2), continuous	Proper operation of the kilns (e.g., drying to the appropriate moisture content)
WEST FRASER-OPELIKA LUMBER MILL	AL-0257	AL	206-5004-X005	11/1/2013	VOC - 3.7600 LB/MBF	Two(2) 87.5 MMBF/YR Continuous kilns with a 35 MMBtu/hr direct-fired wood burner	None
WESTROCK COATED BOARD, LLC COTTONTON SAWMILL	AL-0322	AL	211-5005-X007	8/5/2015	VOC - 4.2100 LB/MBF	Continuous Direct-fired Lumber Dry Kiln with 34 MMBtu/hr Wood-fired burner	Modification of existing batch-style kiln to continuous lumber dry kiln by addition of conditioning chambers and modifying circulation of air flow

Attachment 4 – Kiln Operating Procedures to Demonstrate BACT

Troy Lumber Company
PSD Permit Application
Appendix H
Kiln Operating Procedures to Demonstrate BACT

Introduction:

As detailed in Section 6.2.5 of the application, based upon the top-down BACT analysis, Troy has determined that proper maintenance and good operating practices are the only controls technically and economically feasible for the proposed continuous indirect fired kilns. Proper operation is defined as observing a proper drying schedule and a temperature based on moisture content of the lumber to be dried and the manufacturer's specifications. Proper maintenance will also be completed on all kilns based on the manufacturer's recommendations.

The following provides a summary of the "good operating procedures" and maintenance Troy Lumber currently implements/performs at the Troy facility for its continuous kilns (note that Kiln 2 is being converted to a continuous kiln and once that conversion is completed, the following procedures will be implemented for that kiln). These procedures include several automated systems to ensure proper operation.

Operating/Maintenance Procedures:

Troy Lumber has 2 double track, bidirectional continuous dry kilns and 1 batch dry kiln. The continuous dry kilns are operated in the same manner. Lumber is loaded on kiln carts at opposite ends of the kiln and "pushers" push the lumber through the dry kiln. During this process, Troy monitors the temperature and humidity inside the dry kiln. If the humidity within the kiln reaches a pre-set limit, the roof vents will automatically open to release moisture from the kiln.

Temperature inside the end chambers range from approximately 135° to 150° Fahrenheit. The temperature inside the heat chamber ranges from approximately 242° to 250° Fahrenheit. If the temperature drops below setpoints, the pushers will slow down to compensate for the drop in temperature. Checks of the kiln push rates are periodically performed to ensure they are maintained within the correct ranges.
In the event that a pusher fails, it is either identified by an alarm on the operator's control screen or site personnel will observe the issue immediately (note that the facility's forklift drivers, who load and unload the lumber, are at the kilns constantly). In addition, the facility's boiler and dry kiln operators make visual checks in the kiln area once every several hours.

The main heat chamber is broken down into zones. In each zone, there are thermocouples that measure temperature and regulate valves which let the steam flow through the coils. This automated system ensures that the facility can maintain a set-point temperature.

In addition, the end chambers and heat chambers are equipped with fans for air circulation (or flow). Air flow checks are performed during kiln commissioning to determine maximum air flow and ensure there are no "dead spots" within the kilns. Troy monitors the fan's amperage readings, hertz (fan speed), and direction. Typically, the main heat chamber fans change direction every few hours to maintain constant temperature and airflow through the lumber. If a fan is not working properly, it will provide an alarm so that corrective action/maintenance can be performed.

Finally, there are daily, weekly, monthly, and semi-annual maintenance that is performed on the dry kilns in accordance with manufacturing process.

Summary:

The good operating procedures and maintenance performed on the kilns is intended to maximize the drying efficiency of the kilns as it is a critical component of the overall process. If the lumber is too dry, the facility will lose production. Conversely, if the lumber is too wet, the facility will lose grade. By maximizing the drying efficiency, it will prevent the facility from "over-drying" the lumber and creating excess emissions.

Attachment 5 – Troy Lumber Company Public Notification

*****Insert once publication has been made**